GAS JOURNAL

LIGHT · HEAT · POWER · BYE-PRODUCTS

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Editorial Notes.

Comparisons—Odious and Valid.

ONE method of inducing hypnosis is to concentrate the patient's mind on a small bright object, often a metallic disc; and as normal consciousness recedes, so the disc assumes greater importance, and finally dominates the whole mental process of the subject. In like fashion, concentration on a specific scientific enterprise seems to produce similar results; and the outcome of this is that, as technical processes become more specialized, comparisons between different systems of one class grow more difficult to those who are most intimately interested, and often broad aims are terribly confused by side-issues. However, comparisons, though commonly odious—at least, to one side—are essential at present in the carbonizing and fuel industries, and certainly ought to be welcomed by the gas industry, which enjoys such a favourable position in regard both to conservation of national wealth and to efficient public service.

Lately the paramount need for bringing comparisons of efficiencies—thermal and economic—on to a broader basis, and for dispelling what may be termed pocket conclusions, has become more apparent; this need, undoubtedly, is one of the lessons of the World Power Conference. For example, it is questionable whether the comparisons usually drawn between low-temperature and high-temperature carbonization processes are at all valid. In the first place, the former processes are commercially in a state of infancy, and consequently any financial balance-sheet should show a far greater margin of profit than that yielded by well-established high-temperature systems. This greater margin is to cover the uncertainty of the markets for raw coal and residuals; to allow for the facts that plant may rapidly become obsolete when the possible economies of large-scale working are practically realized, and that plant can never be regarded as working continuously at its maximum output; and to induce the public to invest their money by ensuring fairly high dividends. Up to the present, we have failed to encounter balance-sheets which have taken these factors into due consideration; and, though we are optimistic concerning the eventual success of low-temperature systems where the circumstances are favourable, we are dubious about the market values of the various bye-products—particularly the liquid products, which appear to have by no means the worth which is sometimes attributed to them. After all, the aqueous condensate is more of a liability than an asset, the term "low-temperature oil" has a disconcerting vagueness, as also have the methods of working-up into finished products the substances lying between the spirits and the pitch; and the selling price of the semi-coke designed for domestic purposes is normally assumed to be that of good house coal.

Again, one cannot compare a therm of gas with a therm of electricity without taking into consideration the efficiencies of the appliances through which these two forms of energy are transformed into light, heat, or power. The power load represents a large portion of the output of most electrical concerns, whereas it represents only a small part of a gas undertaking's output; and while the translation of electrical energy into motive power has an efficiency of about 90 p.ct., the corresponding efficiency for gas is under 30 p.ct. To a very much less extent the same reasoning applies to heating, so that care must be exercised not to confuse issues. In this regard, it is well to bear in mind that an electric fire can have an efficiency of 100 p.ct. only when it is placed in an uninhabitable room. The efficiency of the carbonizing process, coupled with the high efficiencies of domestic appliances for heating, cooking, and water heating, should render the gas consumer happy in the knowledge that by employing gas and coke he is conserving the nation's store of coal, in order that he may live by getting rid of what remains to other countries.

Further sources of error and misconception lie in the irritating habit—happily less current now than formerly—of comparing new electric appliances with out-of-date gas-consuming apparatus, and in the readiness with which conclusions regarding the development of an industry in one country as compared with the growth of the same industry in another are drawn without taking into account the vastly different circumstances. However, the foregoing instances—only two out of a host which springs at once to the mind—serve to emphasize the desirability of surveying technical subjects through the eyes of an economist who can achieve no gain, even temporary, by painting an insecure structure in iridescent colours.

Reactive or Non-Reactive?

IT has often occurred to us that there is, generally speaking, insufficient recognition of the practical value of the work undertaken by the Research Sub-Committee of the Gas Investigation Committee of The Institution of Gas Engineers. We are glad, therefore, that Mr. F. J. Dent, of Leeds University, discussed the subject of coke reactivity before the Eastern District of the Scottish Junior Gas Association on Oct. 6. At a time when every effort is being made—or, at any rate, should be made—by the gas industry to produce varieties of solid smokeless fuel which can be utilized in the most efficient and satisfactory manner for water gas production, in domestic hot water boilers, and—last, but by no means least in importance—in the open firegrate, it is appropriate that the intensive research work which has been carried out under the auspices of the Institution at Leeds University, to determine what qualities are desirable in cokes applied to different purposes, should once again enjoy the limelight of publicity.

An extended notice of Mr. Dent's address appears in later columns of our issue to-day; and it supplies an answer to the very important question: What influence

has the reactivity of coke on its use in a water gas plant and on its employment in the domestic firegrate? Regarding the first part of this question, it is obvious that in the actual production of water gas—*i.e.*, during the run period—a coke highly reactive to carbon dioxide and steam is most suitable. During the blow period, however, when the aim is to raise the temperature of the bed as quickly and with as small a consumption of coke as possible, it is equally obvious that an unreactive coke is desirable. To overcome the difficulty, resort has been had to the employment of a thin fuel bed, as in the Dellwik-Fleischer process, in which system a fuel bed 3 ft. in thickness is blown rapidly to burn the carbon as completely as possible to carbon dioxide. Thin beds, however, do not go hand in hand with high efficiency of gas production. The output of the plant is much decreased, and what is saved by a reduction in the potential heat lost in the blow gases is more than counterbalanced by the increased sensible heat of the blow gases, less steam decomposed, and greater steam consumption of the blower and generator. As in most technical operations, compromise is necessary, and the Gas Investigation Committee have arrived at the conclusion that it is best to employ a fairly deep bed—say, 6 ft.—of a reactive coke, and, to minimize the loss due to the production of carbon monoxide during the blow period, to utilize the potential heat of the blow gases by burning with secondary air in waste-heat boilers or in carburettors.

With regard to the second part of the question, H. J. Hodsman and J. H. Dyde have demonstrated that cokes most reactive to carbon dioxide are inferior in radiation efficiency in the domestic firegrate to those which are less reactive. Why this is so was explained by Mr. Dent in his address. However, the domestic consumer is far more concerned about such qualities as ease of ignition, flexibility—by which is meant the rapidity with which a fire will burn up on replenishing with fuel—and cleanliness. A smokeless domestic fuel should have a low ignition-point; and the results of the work of the Gas Investigation Committee indicate that cokes prepared at low temperatures are better in this respect than those made at high temperatures, and that coke manufactured in continuous vertical retorts has a lower ignition-point than coke purchased from the same coal in horizontals. As for cleanliness, this, of course, is entirely dependent on ash content. Moreover, Bligh and Hodsman have shown recently that the radiation efficiency of coke is closely associated with the amount of ash it contains—the greater the quantity of ash, the less the radiation. The production of a low-ash coke, therefore, should be the aim of all gas undertakings; and in this respect we cannot help thinking that low-temperature fuels produced from cheap slacks which contain a large proportion of ash will suffer in competition with high-temperature gas coke prepared specifically for the domestic market.

"Festina Lente."

However desirable may be a course of action, it is usually the case that the end aimed at will be but imperfectly attained by the employment of undue speed; and the good old Latin motto "Hasten slowly" is one that it is always well to keep in mind. But if rash impetuosity has its dangers, an indulgence in over-caution is likely to prove even more of a handicap from a business point of view. The too eager person will get somewhere, and maybe to the wished-for spot; but he who stands still obviously can get nowhere. The wise policy is to take the medium course, and hasten slowly. Certainly this would seem to be the moral to be drawn from the remarks made by Mr. R. J. Rogers, of Birmingham, at last week's meeting of the Midland Association of Gas Engineers and Managers, in opening a discussion on the inspection and maintenance of consumers' gas fittings and appliances. This is a subject which can never be out of the mind of the modern manager or distribution superintendent. It is one which has received recent attention in these pages—but after, be it noted, the Midland Association had decided to include the item in the programme for their meeting. The Association fully recognize the importance of the problem, as is further evidenced by the fact that a year ago also it was considered, in one particular phase, at their autumn meeting.

The gas industry is neither such a poor thing as some of those who do not love it would have one believe—though possibly they have not this belief themselves—nor is it so great a thing as it might be, and will be, if everything connected with it is brought to, and maintained at, the top notch of efficiency. Gas apparatus cannot give the best results unless it is kept in perfect condition; and the average gas consumer is either unwilling or unable—or both—to do this for himself. Therefore he must be assisted; it is in selecting the most desirable method of assisting him that the problem mainly lies. What is done in a large town may be inapplicable to smaller places; but at bottom, the same need exists in both. To advertise the advantages of gas in the Press and on the hoardings, while ill-kept and faulty gas fires were in operation in any numbers on the district, would be much like pouring water into a pail which had a hole in it; so long as even one such fire existed, the advertisements would fail to have the maximum effect. With lighting it is much the same. Probably far less harm would result to a gas undertaking from the substitution of an electric lamp for a gas burner, than from the continued operation of that gas burner in a dirty and unadjusted condition. The pity of it—that there should be so many burners which do a grave disservice to the industry.

Any slight tendency to irritation which one may notice on the part of those engaged in connection with the sister industry is of good augury for gas. Let it hearten us, and strengthen our resolve to move forward constantly—not in sudden rushes, but by sustained level steps. Let us hasten slowly. This applies in other directions also, but the particular aspect of the question now under consideration is the inspection and maintenance of the gas appliances on consumers' premises, which is the only method of getting at the disreputable examples of gas lighting to which allusion has just been made. That an efficient system of periodical inspection and maintenance is essential to the permanent prosperity and future progress of the industry was the opinion expressed in the early part of last year by the joint conference organized by The Institution of Gas Engineers and the British Commercial Gas Association; and the need of such a system is as great to-day as it was then. The question is as to the precise method of procedure to be adopted; and it is just here that Mr. Rogers uttered a warning to those who have as yet done little in the way of maintenance, that they should hasten slowly, and build up their scheme logically step by step. In this way trouble may be avoided and the greatest measure of goodwill may be secured. And remember, too, that just as advertising must fail of its full purpose in the absence of efficient maintenance, so also must maintenance fail of its full purpose in the absence of constant pressure and composition of the gas. It does not sweeten the temper of a consumer to find, half-an-hour after the maintenance man has left, that the burners which have been carefully adjusted need readjusting because of some change in the character of the gas supply.

Are You Adequately Insured?

It is to be doubted whether there is any other single item affecting personal well-being that is so liable to neglect as insurance. How often is payment neglected of the very reasonable premiums that will enable one to rest in peace at night? And even when insurance in certain respects is offered for nothing, what proportion of the regular readers of the paper offering it will take the trouble to sign and send in the necessary coupons? Once more, how many of the recipients of pocket-books are sufficiently interested to expend the few coppers stipulated in order to secure the benefits under the scheme? In these times of ever-growing strenuousness, risk is piled upon risk; and possibly no really sufficient provision will be made, except by a compulsory system of insurance against all contingencies. Heartbreaking results of the absence of third-party insurance in personal cases come to light from time to time; and it seems absolutely inexcusable that an innocent sufferer should be the victim of another person's

neglect, while the individual at fault perhaps gets off scot-free.

These reflections of course bear almost entirely upon personal insurance. Where business undertakings are concerned, one can look with a certain degree of confidence to a clearer recognition of responsibility. But here again, is everything done that should be? Could any accident or catastrophe that is insurable against injure the business through neglect of this precaution? If so, is it wise to run the risk? So far as the gas industry is concerned, as is the case with maintenance, there is general agreement on the matter of principle; it is in the method of carrying this principle into effect that one finds divergencies. One plan may be just as good as another; but in case of difference in this respect, choose the best—that is, the most secure. Are you sufficiently covered in respect of your employees, works, plant, machinery, profits, third-party risks, &c.? And if so, how? Perhaps you are not sure; and, if that is the case, lose no time in going thoroughly into your policies, or in getting capable advice if there is any doubt about the legal interpretation of the clauses. Many gas engineers, we feel sure, will go carefully into this matter, as the result of what Mr. A. S. Foster, of Stourport, had to say in opening a discussion at last Thursday's meeting of the Midland Association of Gas Engineers and Managers on the subject of gas undertakings' insurances. Therefore they will be under a debt of gratitude to Mr. Foster for having introduced the subject.

Some interesting views were forthcoming at the meeting; but it was clear to those present that further valuable information would have been given by members if only they had had an opportunity of reading in advance the opening statement of Mr. Foster, and of studying the points which he was intending to raise. Then they would have examined their policies and gone to the meeting primed with details as to what was done by their own particular undertakings. Well, it is not too late. It is an important question; and though we are aware that the National Gas Council give much useful guidance in the matter, there are doubtless many interesting points to be elucidated. To this end we shall welcome for publication in the pages of the "JOURNAL" correspondence which may prove likely to assist readers. It will be noticed that Mr. Foster himself, towards the end of his remarks, suggests various risks which should be covered for third party. What is the general practice with regards to these particular risks?

Encouragement.

In his Presidential Address to the Manchester and District Junior Gas Association, Mr. H. J. Hailstone, who is Chief Chemist to the Rochdale Gas Department, treated his hearers to a lecture on subjects of general and wide interest, and in so doing proved that he is broad-minded, up-to-date in his outlook, and something of a philosopher. His theme was the position of the juniors in the gas industry, whom he regards as far more important members of the profession than formerly, and as likely to enjoy a progressively improved status; and a glance at modern tendencies leaves one in no doubt that this desirable evolution is happening. Take, for example, the constant increase in technical control and the application of scientific methods in our processes; it is upon the "juniors" that the vital work will fall, demanding of them much ingenuity and original thought. But it is the present trend towards decentralization that will play as large a part in raising the status of the younger men. Recognition is rapidly spreading of the fact that the chiefs of industrial concerns cannot give of their best and, as Lord Leverhulme says, find "time for creative thought," unless they pass on some responsibility to those below; and the modern tendency is to respect not the chief who jealously guards his knowledge and his responsibility, but him who is prepared at any time to order his subordinates to "carry on;" and any junior who is worth his salt will eagerly await the opportunity to assume that responsibility.

We need not doubt, then, that these tendencies, coupled with the Education Scheme for training and certification and with the determination of the rising generation of gas men to "make good," will combine to supply most of the essentials of improved status. There remains, however, the other side of the implied bargain; and gas undertakings, of whatever size, must make the hire worthy of the labourer. For many years we have cavilled at examples of parsimony and short-sighted meanness which have come to our notice through announcements of "Situations Vacant" and other more direct channels; and in some cases we have had the satisfaction of seeing jobs go begging until a revised offer has come along. Now there are signs of betterment in this direction; and after all, undertakings are not asked to give something for nothing, or something merely for the letters of qualification after a man's name. As Mr. Hailstone pointed out in his address, improved status is closely bound-up with financial gain to an undertaking; and we would add our opinion that if those responsible for the conduct of an undertaking cannot see this—or, seeing it, cannot find the salary for adequate technical supervision—it is time for them to look around and discover if amalgamation cannot raise their undertaking from the slough.

Some of the more timid among those contemplating launching their ship into the somewhat troubled sea of the gas industry may ask if there will be jobs for all who strive and make good. For them Mr. Hailstone has a word of encouragement, as he claims—and few modern critics will dispute with him—that most gas-works are still technically understaffed; and, as pointed out above, the inevitable increase in scientific control will make, not obliterate, billets for the highly trained. Again, it may be objected that the hoped-for growth of amalgamation or joint working will tend to lessen the number of responsible positions available; but our view is that the result will be more specialization, and more useful work for no fewer men. And there will be higher laurels to be gained. In his broadcast message at the conclusion of the World Power Fuel Conference, to which we referred in these notes last week, Sir David Milne-Watson voiced the general impression of the delegates that the day of the small undertaking—whether gas, steel, or electricity—was over, and, further, that there existed apprehension that there might be a shortage of men of the calibre to deal with the great schemes of the future. Let this be an encouragement to the juniors to be, as Mr. Hailstone aptly puts it, "earnest and ambitious in obtaining a knowledge suited to the requirements of our growing industry."

A Friendly Nod from "The Times."

The Daily Press wields prodigious power in these days, when men and women have little time in which to form opinions for themselves by thought and serious reading; and the humdrum Technical Journalist might be forgiven for picturing, in his nightmares, the "Dailies" as a gigantic ogre holding John Citizen in one hand and with the other stuffing him with sensational "scoops" and football coupons of fantastic value. But standing aloof, and regarding the orgy with judicial mien, is usually to be found "The Times;" and thus we are the more pleased to notice our august contemporary according space and comment to the gas industry. In an extremely well-balanced leader on Oct. 5, entitled "Coal, Gas, and Power," comment was made upon the Fuel Conference; and it was remarked that the latter provided a leading part for gas manufactured from coal by some mode of carbonization. After indicating the broad lines taken in the discussions, "The Times" remarked that the gas industry would welcome a complete reshaping of the law relating to gas supply. The article concluded with a compliment to the gas industry on the score of having denied antagonism to low-temperature carbonization and of having narrowed the breach between itself and electricity.

Non-Party Politics.

Three weeks ago we recorded that Col. A. England, C.M.G., D.S.O., the Constitutionalist Member for Heywood and Radcliffe, had written to "The Times" urging in the national interest some relaxation for the gas industry from its very restrictive conditions. Now it is Mr. John Duckworth, Liberal M.P. for Blackburn, who has fastened upon "The Times" editorial mentioned above a letter which was

published in their issue for the 9th inst. If Parliament gives the greater freedom suggested, Mr. Duckworth imagines "that the benefits to the community might well be considerable, and that we should take a notable step forward towards effective smoke abatement." And then we find our old friend Mr. Will Thorne, the Labour member for Plaistow, inveighing against the Government for excluding the gas industry from the rating relief and, in a reference to the legislative proposals, deploring the money wasted in promoting Private Bills in the House of Commons.

No Less Safeguard for the Public.

Mr. Will Thorne's observations were made at a luncheon given by the employers' side to the men's representatives of the National Joint Industrial Council; and Sir David Milne-Watson had previously put-in a further plea for Government benediction of the industry, who were not seeking to withdraw existing safeguards. "If a gas company," said Sir David, "wants to increase its capital, its borrowing powers, or its area of supply, why should it have to seek powers from Parliament? Surely it would be a sufficient safeguard if the gas administration department of the Board of Trade had authority to approve such powers after considering the observations of local authorities. Many undertakings desired greater elasticity in the methods of charging for gas, but without Parliamentary authority they could not depart from the flat-rate system, which had been almost completely abolished in America. The absence of modern legislation jeopardized the interests of shareholders, workers, and consumers, and the Government should release the industry from its bonds." Sir David returned to the attack in a letter published in yesterday's issue of "The Times." This he wrote, as President of the National Gas Council, in comment upon the Oct. 5 leading article referred to above. After stating the industry's broad complaint that existing legislation prevents it being run on ordinary commercial lines, and briefly sketching what reforms are sought, Sir David says: "The proposals of the National Gas Council were submitted by the Board of Trade for examination by a number of public bodies representative of all the varied interests in the community, and while there has no doubt been criticism of matters of detail, the main principles have not been disputed, and it is, I think, generally accepted that amending legislation is an immediate necessity. Although the position has been brought to the notice of the Government, no steps have yet been taken to introduce the necessary legislation."

The Berlin Exhibition, 1929.

Elsewhere in this issue we given a few details of the big gas exhibition which is to be held in Berlin from April 19 to July 21 next year. Many of us still have very pleasant recollections of a visit to the last big German exhibition which was held in Munich in the summer of 1914—recollections both of what was shown, and the manner in which it was shown to us. The German takes a pride in, and makes something of a speciality of, displaying his wares, and from accounts that we have of a recent visit, for instance, of a party of English mining engineers to the Kuhr mines, we believe he has lost nothing of the businesslike art of organizing such tours for the maximum of interest and instruction combined with comfort. The promoters of the 1929 exhibition are most cordially inviting their British confrères to go to Berlin in 1929; they are even taking steps to insure that the annual meeting of the German Gas Association shall not clash with that of the Institution. We have no doubt the response will be equally cordial. Two years of planning will certainly have produced something really worth seeing, and there are certain differences in general gas-works practice in Germany which are bound to be interesting. Gas supply over long distances is in an advanced state of development there, and other people's consumers' appliances are generally worthy of study. Moreover, the English visitor will not be allowed to feel a stranger in a strange land.

Purchasing by Instalments.

The extension of the system of payment by instalments for an ever-growing number of goods, forces continually more and more classes of business people to take serious note of it. Mr. J. Gibson Jarvie, Managing Director of the United Dominions Trust, Ltd. (a barrister-at-law, and a recognized authority on the system of "consumer credit," or purchase by instalments), who has accepted an invitation to deliver an address in New York on a system of credit that America has made almost her own, when interviewed by a Press representative, remarked that we on this side have been slow to recognize that this type of credit is financially, commercially, and economically sound. There are, he said, still responsible people in this country who fight shy of "consumer credit," mainly because it possesses certain elements of novelty. But the really novel factor lies in its application in recent years to new and wider classes of property. Life insurance, for example, is a system of selling by instalment; dwelling houses and heavy rolling stock have long been sold on a similar system. More recently the principle has been extended to all classes of goods possessing an identifiable utility value—including, for example, labour-saving devices, gas and oil engines, and mechanical road vehicles of all kinds. "From the consumer's point of view," Mr. Jarvie argued, "instalment purchase ensures a higher standard of living; while for the manufacturer it is essential to mass production. America owes much of her post-war prosperity to her realization that mass production is an entirely logical development socially and industrially, and that mass production demands mass consumption. The financing of instalment purchase, or any other form of consumer credit, supplies at least one missing link in the endless chain of production, distribution, and consumption. America re-discovered and applied the secret nearly twenty years ago. Are British manufacturers and distributors yet fully alive to it?"

PERSONAL.

Mr. S. Barker Johnson, the General Manager and Engineer of the Colombo Gas and Water Company, Ltd., who has been spending an eight months' furlough in this country, and who, it will be recollected, contributed a remarkably interesting paper on "Gas Supply East of Suez" to the proceedings of the annual meeting of The Institution of Gas Engineers this year, sailed for Colombo on Saturday last.

OBITUARY.

Mr. William W. Friend, the Engineer and Manager of the Gas Supply Company's Works at Cairns, North Queensland, died on Aug. 11 at the age of 50 years. Deceased had been Engineer and Manager of the Cairns Gas-Works since 1904, when the total output was 3 million c.ft. This year the total output was 32 millions. The works have always been regarded as a model for their size in Australia. Mr. Friend was an Alderman of the Cairns City Council, and was widely respected in the town of Cairns and district, and throughout the gas industry in Australia generally. He leaves a widow and three sons, the eldest of whom has been appointed Manager of the Cairns Gas-Works.

The death took place on Oct. 6 of Mr. John James Stallard, of Portsmouth, who for the last 27 years had held the position of Mains and Service Superintendent to the Portsmouth Gas Company. Mr. Stallard was 58 years of age, and had been in the service of the Company for 43 years. He was very well-known throughout the city, and was at work only a week before his death.

It is with much regret that we have to record the death of Mr. Charles A. Kendrick, which took place at his home at Stamford Hill on Oct. 6. The funeral was on Oct. 10 at Chingford Cemetery. Mr. C. A. Kendrick was associated with the Welsbach Light Company, Ltd., as one of their principal representatives, for over thirty years, and was highly esteemed throughout the gas industry. He continued his activities for the Welsbach Company until his health gave way some two years ago.

It is with deep regret that we have to chronicle the sudden death, on Saturday morning last, after a short illness, of Mr. Noah Wright, Gas Examiner and Public Lighting Engineer of the County Borough of Bournemouth and President-Elect of the Association of Public Lighting Engineers. As recently as at the Sheffield Conference of the Association in July last, Mr. Wright was chosen as next year's President. He had been looking forward to the Bournemouth summer meeting. Mr. Wright leaves a widow and six children to mourn his loss. The interment took place at Bournemouth Cemetery on the 17th inst., when the Association was represented by Mr. W. J. Liberty, Hon. Secretary, who placed a wreath at the graveside in the name of the Association.

SCIENTIFIC AND INDUSTRIAL RESEARCH.

Sir David Milne-Watson Appointed to the Council.

Under the Order in Council dated Feb. 6, 1928, the Lord President of the Council has appointed Sir David Milne-Watson, LL.D., D.L., and Mr. Robert Whyte Reid, C.B.E., M.I.Mech.E., to be members of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research, in the place of members who have retired on the completion of their terms of office.

This brief announcement, received under date Oct. 10 from the Secretary of the Department of Scientific and Industrial Research, will give keen gratification to the whole gas industry. Sir David Milne-Watson thus joins the small body of experts to whom all proposals for research stand referred.

EDUCATION FOR SALESMANSHIP AND ENGINEERING.

Mr. F. W. Goodenough and Sir Dugald Clerk as Chairmen.

The publication of the list of very representative and influential business men and women comprising the Committee on Education for Salesmanship recently appointed by the President of the Board of Education, which we give below, must make everyone in the gas industry feel much gratified that the Chairman selected by the Government to preside over and direct its activities is the Chairman of their own Salesmanship Organization (the British Commercial Gas Association) and their own Education Committee.

This gratification is further enhanced by the knowledge that the Committee on Education for Engineering which is in process of formation is to have for its Chairman a Past-President of the Society of British Gas Industries.

All will unite in congratulating Mr. F. W. Goodenough and Sir Dugald Clerk on the honour thus conferred upon them and upon our industry, and in wishing them every success in their new spheres of public service.

COMMITTEE ON EDUCATION FOR SALESMANSHIP.

Mr. F. W. Goodenough (Chairman), Sir Charles Addis, Alderman Charles Aveling, J.P., Sir Ernest J. P. Benn, Bt., Mr. H. J. Bostock, Sir Harold Bowden, Bt., Col. Sir George Maclaren Brown, Mr. F. R. Chitham, Sir Robert Waley Cohen, Sir Edward Davson, Bt., Mr. James L. Ferguson, Prof. Fred Hall, M.A., Sir William J. Larke, Sir Edward Manville, Miss E. W. Mawdsley, Sir Alexander R. Murray, Miss L. F. Nettlefold, Mr. C. E. D. Peters, Mr. P. J. Pybus, Mr. H. A. Reincke, Mr. Gilbert Rich, Mr. H. A. Roberts, Mr. G. H. Spilman, Sir Edwin Stockton, Lieut.-Col. R. H. Tatton, Sir Gilbert C. Vyle, Sir Lawrence Weaver, Major Frank Wedgwood, Col. the Hon. Vernon Willey, and Mr. W. J. U. Woolcock.

Mr. H. B. Wallis will act as Secretary, and all communications should be addressed to him at the Office of the Board of Education, King Charles Street, Whitehall, London, S.W.

COAL RESIDUES IN CONCRETE.

Effect on Steelwork.

The Joint Committee of Societies connected with the building industry which has been inquiring into the use of coal residues in concrete in contact with steel has issued a report embodying the unanimous conclusion that "the following coal residues—namely, ashes, cinders, coke breeze, pan breeze, breeze containing ashes or cinders, and clinker passing a ¼ in. mesh—are unsuitable materials for use as aggregates for concrete in contact with steel."

With regard to clinker when thoroughly vitrified, free from coal, and screened, to be retained on a ¼ in. mesh, the Committee has not yet sufficient information to determine whether such clinker used in place of coarse aggregate and in conjunction with a good clean sand is in itself detrimental.

The report states that the inquiry was made because of "the detrimental results which are frequently observed from the use of coal residues in concrete in contact with steel." There are, it is stated, three primary causes of defects. In the first place, concretes made from coal residues are liable to expansion on setting, or, if the setting expansion is suppressed by a rapid drying out of the mass, expansion may occur should the concrete at a later date become wet from atmospheric or other conditions. The second cause of defects lies in the high permeability of concretes made from coal residues, which permits access of air and moisture to the steel, with consequent risk of corrosion. In the third place, the presence of sulphur compounds in the aggregate may, under conditions favourable to chemical action, lead to corrosion.

THE NATIONAL GAS COUNCIL.

Central Executive Board.

A Meeting of the Central Executive Board took place on Oct. 9 at 28, Grosvenor Gardens, S.W.—Sir David Milne-Watson in the chair.

COKE OVEN GAS.

It was reported that a meeting of the Joint Standing Committee of representatives of the National Gas Council and the National Association of Coke and Bye-Product Plant Owners had taken place on Sept. 12, when a case was considered as to the price at which an existing contract for the supply of coke oven gas to a gas undertaking should be renewed. It was stated that a satisfactory agreement had been reached; and emphasis was laid upon the advantages to be gained by the formation of the Joint Committee.

WORLD POWER CONFERENCE.

In view of the very full reports that had appeared in the technical and the daily Press regarding the Fuel Conference which had just concluded at the Imperial Institute, it was not considered necessary to do more than express satisfaction at the success of the conference, and at the manner in which the gas industry had contributed to that success.

BRITISH INDUSTRIES FAIR, BIRMINGHAM, 1929.

Mr. H. D. Madden, Mr. S. Tagg, and Mr. R. E. Gibson were elected as representatives of the Council to serve upon a Joint Committee of representatives of various bodies in the gas industry with regard to organizing a conference which it is proposed to hold during the British Industries Fair at Birmingham next year.

SOCIETY OF BRITISH GAS INDUSTRIES.

Council Meeting.

A Meeting of the Council was held on Wednesday, Oct. 3, at 56, Victoria Street, Westminster, when there were present: Mr. R. J. Milbourne (Chairman) in the chair, Mr. C. A. Goodall (Vice-Chairman), Messrs. G. J. Jackson, F. Dobson, E. J. Fox, T. A. Braddock, Frank West, B. B. Waller, J. Winson Scott, A. H. Lymn, E. J. Davison (Hon. Secretary), and Arthur L. Griffith (Secretary).

Apologies for absence were reported from Messrs. G. Clark, R. B. Hodgson, D. M. Gibb, C. R. F. Threlfall, Samuel Cutler, and F. J. Gould.

The Chairman read a letter from Mr. Harold Talbot resigning his seat on the Council and the Chairmanship of Section VII. in consequence of his retirement from the Welsbach Light Company, Ltd. The resignation was received with much regret, and the Secretary was instructed to convey to Mr. Talbot their thanks for his valuable services, and best wishes for every success in his future work.

It was reported that the Vice-Chairman, Mr. C. A. Goodall, represented the Society at the laying of the foundation stone of the new buildings of Leeds University by the Duchess of Devonshire on Oct. 2.

An application for membership was considered from Alexander Comley, Ltd., of Birmingham; and they were unanimously elected members of the Society under Section XIV.

The report of the Federation of British Industries for September was submitted.

It was reported that, in connection with the Gas Industries Section of the British Industries Fair, Birmingham, 1929, a Joint Conference would be arranged by The Institution of Gas Engineers, the British Commercial Gas Association, and the Society. A Joint Committee would be formed consisting of the President or Chairman of each body, with two nominated representatives from each to go into further details and arrange for the Conference.

Mr. Samuel Cutler and Mr. F. J. Gould were nominated the Society's representatives.

The arrangements for the Autumn General Meeting on Nov. 22 were reported. The Chairman stated that he would give an address entitled "Gasholder Sheeting."

Index to the "Journal."

The Index to Vol. 183 of the "JOURNAL" will be published as a supplement in our issue for Oct. 24.

"Gas Salesman" Supplement.

The "GAS SALESMAN" which is published as a supplement to-day contains the speeches of Mr. F. W. Goodenough and Lord Eustace Percy, the President of the Board of Education, on education for salesmanship.

THE GAS INDUSTRY AND HIGHWAY PROBLEMS.

By R. W. EDWARDS, Chairman and Managing Director of the Aldershot Gas, Water, and District Lighting Company.

I.—THE LOCAL SITUATION.

In a letter written on Jan. 16 of this year I made use of the following words: "Our experience has shown that opening and reinstatement cost . . . more with concrete than with an ordinary road." The necessity for writing this letter arose out of a particularly harassing experience through which I was going at that time. In December of last year it was decided to widen and reconstruct a certain road in a district served by my Company. This road—a length of only 1140 yards—was to be reconstructed in ferro-concrete, at a cost estimated at over £15,000. The scheme was vigorously opposed by my Company, who bear a very heavy share of the burden of local rates in the said district. I shall deal fully with the reasons for our opposition in the instance in question, as these reasons apply to all cases of a like description, and set forth the difficulties which face gas companies in the light of recent developments in road construction and reconstruction, and which will continue to confront them as long as the legislation on the subject remains in its present state.

Prior, however, to going into the general considerations raised by the case in question, I might first explain why I should describe it as "particularly harassing." It was so in two ways. In the first place, owing to the road's propinquity to our largest gas-works, underneath its surface lay some important pipes, while it also received some very large gas mains as they emanated from the works. Secondly, there was nothing in the importance of the road itself, from a transport point of view, to merit such reconstruction, for it was a by-lane with one end "blind." Even at that, the road was only partially developed. It was this latter consideration which rendered me alive—to an extent that nothing else could have done—to the vital importance of fresh legislation, remedial from the point of view of all parties concerned, on the subject of mains and cables in highways; for the fact that a "blind alley" could be held to merit reconstruction in ferro-concrete seemed to me to presage the revolution in the construction of roads and bridges on which Colonel Ashley laid so much stress in the speech from which I quoted in my introductory article [*ante*, p. 101].

What, then, are the difficulties involved in the reconstruction of roads in ferro-concrete, viewed primarily from the standpoint of gas undertakings? Mary of England is reported as having said that the word "Calais" would be found imprinted on her heart: I think I might with equal justice claim that the case to which I make reference in this article imprinted on my heart the salient tribulations which beset gas undertakings in such circumstances. To my mind the most serious inconvenience involved in such reinforcement of the surface of roads in ferro-concrete lies in the fact that it entails that the underground works of gas—and other public utility—undertakings will be practically inaccessible. This inaccessibility would operate to the detriment of such undertakings in a variety of ways. First of all, it would in effect deprive them of their statutory privilege of laying mains and pipes in highways to meet the requirements of the public. Again, where such mains have been laid prior to such reconstruction, to break up the highway in question would involve vastly increased delay, while the costs of such breaking-up would be considerably more than they would normally be. These difficulties are more pronounced where the road so reconstructed is only partially developed, owing to the increased difficulty and expense in laying service pipes, &c. Further, the undertaker would be faced with serious difficulty in detecting leakages, with the grave risks and losses attendant thereon. Finally, such expenses and losses, if the undertaking is to be carried on, could not but be reflected on the consumer by increased charges for the commodity. This, of course, would be detrimental to the general public, whose interests must always be our primary consideration.

These and the like arguments notwithstanding, the reconstruction of this road was approved of by the Ministry of Transport, from whom a grant of 25 p.ct. is promised to enable it to be carried out. To my mind this case is of interest for several reasons. First and foremost because, as already indicated, it exemplifies the general tendency to use ferro-concrete in the reconstruction of roads—a tendency which must of necessity become more pronounced as time goes on, owing to the exigencies of the ever-increasing traffic on the roads, which to-day is represented by private motor cars to the extent of one for every fifty-six persons, while it is anticipated that in a short time there will be one for every twenty-five persons. Secondly, it demonstrates that some arrangement will have to be arrived at sooner or later—and the sooner the better—between public utility undertakings and highway authorities on the questions at issue. Thirdly, it shows that the Ministry of Transport could, if it so chose, make provision for public utility expenses entailed by the remaking of roads in this manner. Finally, it is interesting from the point of view of the reader of these articles in that it led to my raising the general question of the difficulties before such bodies as the Conjoint Conference of Public Utility Associations and the Gas Companies' Protection Association—with results which properly fall to be dealt with in my next article, which will treat of "The General Situation."

FUEL RESEARCH BOARD.

Activities during 1927-28.

Annual Report Reviewed by T A. TOMLINSON and M. BARASH.

This report [Department of Scientific and Industrial Research. Report of the Fuel Research Board for the period ended March 31, 1928, with Report of the Director of Fuel Research. London, H.M. Stationery Office (Adastral House, Kingsway, W.C. 2), 1928. Pp. VI. + 70. Price 1s. 3d. net] covers the activities of the Fuel Research Board during the period from Jan. 1, 1927, to March 31, 1928; and though we are not told what sum of public money was expended during this period, the many lines of action and the many solid results recorded prove that never was public money better spent. The leeway in our exact knowledge of the country's coal resources is being rapidly made up. Within a very short time, 85 p.ct. of the total coal output of Great Britain will be covered by survey committees and laboratories. But we have not yet seen the results of the tests on coals from the Bristol and Somerset coalfields mentioned on p. 15. The vastly important question of the correct method of sampling coal is being grappled with, and measures have been taken for collaboration with the British Engineering Standards Association. "It is obvious," says the Chairman of the Board, "that, no matter how perfect the methods of analysis, the results are of little value if the sample on which they are used is not representative." Coke is being actively studied in several directions. Can we not make up our minds to speak of the coking power of coal instead of "caking"—an obviously inaccurate term? The indiscriminate use of the two terms appears to have no justification.

LOW-TEMPERATURE CARBONIZATION.

We are particularly glad to note the investigations into the domestic use of coke, because it seems to us that this line of attack may very well give useful results while we are waiting for the commercial success of low-temperature carbonization. With regard to the latter, we note that improvements have been made in the Parker plant. A test on the MacLaurin plant of Glasgow will be welcomed if only because of the conflicting rumours about its ability to show a profit. The Gas Light and Coke Company's commercial size low-temperature plant, based on the Fuel Research Board's design, is expected to be in operation at the Richmond Gas-Works before the end of this year. The Chairman explains that he has dealt at some length with low-temperature carbonization not because it is "necessarily the most important aspect of fuel research," but frankly because of the public interest in it. It appears that hopes have been raised which are doomed to disappointment: "Low-temperature carbonization of coal can hardly be expected to supply oil of suitable quality in sufficient quantity to make the country independent of imported oils." This conclusion has received further recent support at the World Power Fuel Conference just concluded in London. The disposal of low-temperature tar is still a problem rather than an asset of the process. Though the possibility has been envisaged of low-temperature carbonization "replacing a large proportion of the coal that is now burned in domestic fires by a smokeless coke," we welcome Dr. Margaret Fishenden's efforts to ascertain whether a grate cannot be constructed which will burn satisfactorily the supplies of "smokeless coke" which are already available.

TREATMENT OF COAL WITH HYDROGEN.

Work on Berginisation is being directed "more to a study of the factors involved in the process than to an attempt to

develop it on commercial lines." What appears to be the most outstanding and far-reaching discovery made during this investigation is that it has been found possible, "by treatment with hydrogen at suitable temperatures and pressures, to increase the caking properties of a coal or to confer them even on such non-caking coals as anthracite." Not only can one visualize important industrial developments from this, but considerable light should be thrown on the constitution of coal and of the constituents which are responsible for its coking properties. In five-and-a-half pages Sir Richard Threlfall has given an inspiring picture of the work of his Department.

Coal Sampling.

The report in detail is contributed by the Director of Fuel Research, Dr. C. H. Lander. By a comprehensive and valuable piece of work carried out on seven ships' cargoes, it has been shown that the method of taking coal samples from the "flowing stream" gives much more consistent results than those obtained from a stationary heap or from the surface of trucks. Further details of the means of realizing this method in different circumstances will be awaited with interest. The promised report on the melting-point of ash will also be welcomed.

The figures given of the tests in the vertical retorts on coals of different sizes whet our appetite for more. We have so often been told that there is some difficulty in carbonizing slacks in verticals that we are a little surprised to find that not only did the screenings through $\frac{3}{4}$ in. give better gas yields per ton, but the production per retort in therms was well maintained. The fact, too, that gas at 536 B.Th.U. was made with a thermal yield comparable with that at 499 B.Th.U. from Mitchell Main coal from $\frac{3}{4}$ in. to $\frac{3}{8}$ in. is distinctly interesting. The scientific study of carbonization in horizontal retorts will be difficult to realize. The fact that the temperature in a horizontal retort varies from 930° C. at one end to 1120° C. with a combustion chamber temperature of 1350° C. is enough to show the complexity of the task. The investigation into the manufacture of water gas with different cokes is a necessary addition to the study of coals.

A Tar and Liquor Separator.

Particularly interesting is the little side-line in the shape of a tar and liquor separator. It seems to us to be a little difficult to clean, and we should like to know whether any troubles have been experienced in this direction, and whether it was necessary to place a catch box for pitch earlier in the circuit.

The principle of the separator is that of a labyrinth. The path of the mixed tar and liquor from one end of the separator to the other is obstructed by vertical baffles, which cause it to change direction at right-angles very many times. It would appear that on each occasion when the particles impinge upon an obstructing surface there is a tendency to assist the separation. A separator actually in use at the Station is dealing satisfactorily with the tar and liquor from the vertical retorts in which 10 or 15 tons a day is being carbonized. Information with regard to the separators, including blue prints, has been given to a variety of inquirers. As the result of one of the inquiries, a separator was erected, by a gas company, for dealing with some 8000 galls. of tar and liquor per day from a setting of vertical retorts. A continuous separation was maintained in which the liquor content in the tar was reduced to 4 or 5 p.ct. The separator is shown in the next column.

Coke.

The section of the Director's report dealing with coke is of great importance, but we think it will probably give rise to some controversy until further details are published, particularly with regard to the production at gas-works and coke ovens of a coke more suitable for open grates and general domestic purposes. Dr. Fishenden's experiments with coke fires ignited by gas are distinctly interesting, though we think the figures need further interpretation. Even for the gas coke fire, a gas consumption of 2800 B.Th.U. is negligible. It is equivalent to less than 0·03 of a therm and costs less than 0·3d., and it does away with the necessity for paper and wood or any other fire-lighting material. Much remains to be done to place tests for the reactivity and ignitability of cokes on a satisfactory footing.

Investigation of Pitches.

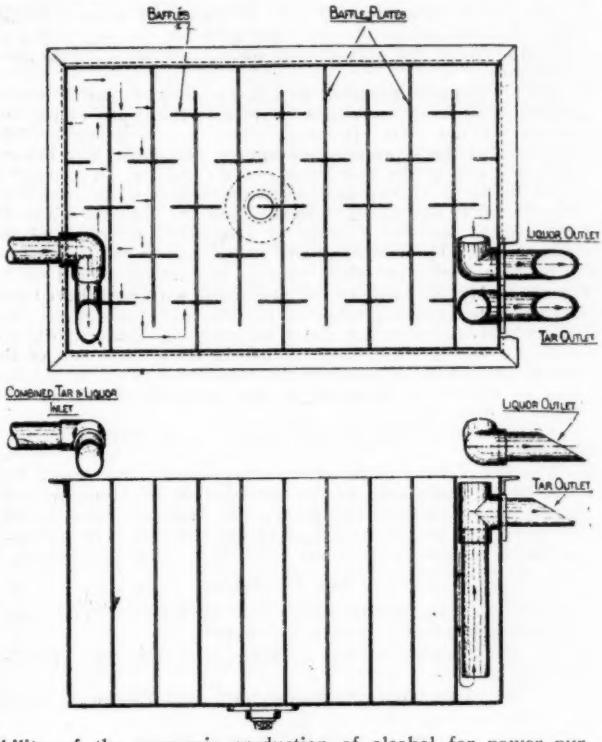
The investigation of the value of pitches for briquetting is also necessary work. It is difficult to understand the apparently considerable importance which is attached to the comparison of the properties of the three pitches described on pp. 36 and 37, taking into consideration the fact that one is produced by distillation up to 360° C., the second by steam distillation at 300° to 320° C., and that the third distillation was completed at 310° C. without steam.

There is little doubt (and a considerable amount of evidence) that had the three pitches been prepared by straight distillation to the same degree, there would have appeared a much closer resemblance in the properties of vertical retort tar pitch and low-temperature tar pitch.

Considerable interest attaches to the comprehensive investigation which is being carried out on coal purification by means of the seven different types of plant which have been installed.

Investigations are also reported on the Diesel engine with blends of low-temperature oil and shale oil, and on a Dorman engine using the spirit obtained from low-temperature tar and scrubbed from low-temperature gas. Satisfactory results were obtained in each case.

Work at the Station, at the University of St. Andrews, and at the Royal Naval Cordite Factory in Dorset, on the possibility of the economic production of alcohol for power purposes at home and in the Empire oversea is also reviewed, but no outstanding discoveries are reported.



Among laboratory and miscellaneous investigations, reference is made to researches on pyrometry, the primary decomposition of coal, the effect of inorganic constituents on the carbonization of coal, the constitution of coal, spontaneous combustion of coal on ships, steam raising, pulverized fuel, furnaces and heat transfer, atmospheric pollution, and refractories.

The above gives a brief indication of the many investigations which are being pursued, and shows how valuable these excellent reports of the Fuel Research Board have become. They are now a feature which must be eagerly anticipated by the fuel technologist in every branch of power production and utilization, as well as by every intelligent layman.

FORTHCOMING ENGAGEMENTS.

Oct. 18.—Eastern Counties Gas Managers' Association.—Autumn meeting in London.

Oct. 20.—Scottish Junior Gas Association (Western District).—Visit to the Kingshill Colliery of the Coltness Iron Company, Ltd.

Oct. 22-24.—British Commercial Gas Association.—Annual Conference at York.

Oct. 26.—London and Southern District Junior Gas Association.—Meeting at the Westminster Technical Institute, Vincent Square, S.W. 1, at 7.30. Presidential address of Mr. W. T. Kenshole, of Lea Bridge.

Oct. 27.—Yorkshire Junior Gas Association.—Annual general meeting at Leeds University. Address by Mr. E. J. Sutcliffe, Gas Engineer and Manager, Bradford.

Nov. 3.—Midland Junior Gas Association.—Visit to the Shrewsbury Gas-Works.

Nov. 6.—Society of British Gas Industries.—Council meeting.

Nov. 14.—Southern Association of Gas Engineers and Managers.—General meeting at the Hotel Cecil, Strand, W.C. 2, at 2.15 p.m.

Nov. 22.—Society of British Gas Industries.—Autumn general meeting. Hotel Cecil.

The Institution of Gas Engineers.

Oct. 23.—Purifier Committee (at the offices of the York Gas Company).

Nov. 12.—Corrosion of Pipes Committee, 4.30 p.m.

Nov. 13.—Gas Education Executive Committee, 4 p.m.

Nov. 14.—Finance Committee, 10.30 a.m.; Benevolent Fund Committee, 11.0 a.m.; Executive Committee, 11.30 a.m.

MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

AUTUMN GENERAL MEETING.

The Autumn General Meeting of the Association was held last Thursday afternoon, in the Imperial Hotel, Birmingham—Mr. W. G. S. CRANMER, of Willenhall (the President), in the chair.

The HON. SECRETARY (Mr. T. Thornton, of Rowley Regis) intimated the receipt of some apologies for absence, and read the minutes of the annual and spring meetings, which were confirmed.

The PRESIDENT remarked that before they proceeded further with the business he wished to refer to the death of the late Editor of the "GAS JOURNAL," Mr. A. F. Bezant. The majority of those present had known personally Mr. Bezant, who was one of the best friends of the industry in connection with the Press. The matter was brought before the Committee shortly after Mr. Bezant's death, and the Secretary was instructed to forward a letter of sympathy on behalf of the Association. He had been sorry to see, too, in the issue of the "JOURNAL" received that morning the announcement of the death of Mr. S. Meunier, of Stockport, who he believed was in his early days a member of the Midland Association. Mr. Meunier was at Adderley Street before going to Stockport, and was, he was given to understand, in those days one of the finest athletes to be found in the Midlands. They would also like to express to his relatives the sympathy they felt with them in their loss.

As a mark of respect, the members stood silently in their places.

The PRESIDENT said he felt he must refer to one other thing. Mr. Bezant had passed away; but they had Mr. Harrison in his place. Many of them had known Mr. Harrison for a number of years; and they were quite sure the interests of the industry would be as safe in his hands as in those of his predecessor.

NEW MEMBERS.

The following new members were balloted for, and subsequently announced to have been elected.

Mr. Charles Frederick Dakin, Gas Engineer, Cradley Heath.

Mr. John Herbert Wainwright, Gas Engineer, Halesowen.

INSTITUTION BENEVOLENT FUND.

The HON. SECRETARY intimated the receipt of a letter from Mr. W. T. Dunn cordially thanking the Association, on behalf of the Committee of Management of the Benevolent Fund of The Institution of Gas Engineers, for their welcome donation.

PRESENTATION OF CERTIFICATES.

The PRESIDENT said the next item on the agenda was the presentation of certificates to seven successful candidates in the Higher Grade Examinations in Gas Engineering and Gas Supply. These were young men who were just entering upon a career in the gas industry, and he trusted they would go far. They should remember that a great deal more was required now than was formerly the case, but as against that, facilities for acquiring knowledge were far greater to-day than ever before. At the same time, success could be achieved only by hard work and a considerable amount of self-denial. It had been his privilege to be identified for a number of years with the old education scheme under the City and Guilds of London Institute; and he had watched with very great interest, and a certain amount of pride, the careers of many of the young men who attended the classes in Gas Manufacture and Gas Supply at the Birmingham Municipal Technical School. A number of the students were now holding positions of responsibility in the industry. The Institution Education Scheme was no doubt a great advance on what went before. Still, it was by no means perfect, and would have to be amended to meet the actual necessities of the times. It did not offer adequate facilities for the whole of the students who wished to take advantage of it. It was to be hoped the time was not far distant when to obtain membership of The Institution of Gas Engineers would be a guarantee that the person concerned had had a thorough training, and when advertisers would stipulate that applicants must be members of the Institution. There was also, he believed, a hope on the part of many of them that the local Associations would become branches of the Institution.

The certificates were then presented, as follows:

Mr. J. Downing,	2nd	class,	Gas	Engineering.
Mr. F. H. Nicholls,	1st	,,	,,	,,
Mr. F. A. Rhead,	1st	,,	,,	,,
Mr. C. R. E. Turner,	2nd	,,	,,	,,
Mr. D. J. Ward,	1st	,,	,,	,,
Mr. J. E. V. Cæsar,	2nd	,,	,,	,,
Mr. R. L. Greaves,	1st	,,	Gas	Supply.

OFFICERS FOR THE ENSUING YEAR.

It was stated that no nominations having been received by the Committee, they recommended the following as office bearers for the ensuing year:

President.—Mr. C. M. D. Belton, of Shrewsbury.

Vice-President.—Mr. Alfred Bird, of Bromsgrove.

New Members of Committee.—Messrs. Fred. Davies (Walsall), Alex Mackay (Stoke-on-Trent), and T. Thornton (Rowley Regis).

Auditors.—Messrs. A. A. Leonard (Iron Bridge) and J. P. McCrae (Derby).

Hon. Secretary and Treasurer.—Mr. Arthur Roberts, of Hereford.

These recommendations were cordially agreed to.

The PRESIDENT pointed out that they were losing their Hon. Secretary. Mr. Thornton had occupied the position for about 8 years, and thought it was now time for him to make way for somebody else. It was felt in these circumstances that they could not do better than put Mr. Thornton on the Committee, where his experience would prove of value to the new Secretary.

DISCUSSIONS.

The remainder of the meeting was occupied with discussions upon the following subjects:

"Inspection and Maintenance of Consumers' Gas Fittings and Appliances," opened by Mr. R. J. ROGERS, Fittings Superintendent, Gas Department, Birmingham.

"Gas Undertakings' Insurances," introduced by Mr. A. S. Foster, of Stourport.

Reports of the discussions will be found on later pages of this issue.

Mr. Rogers and Mr. Foster were heartily thanked, on the proposition of the PRESIDENT, seconded by Mr. H. J. WOODFINE (Wellington).

GERMAN GAS EXHIBITION—1929.

In an article in our issue for Sept. 26, we were able to describe something of the difficulties with which the German gas industry is contending to-day, in what amounts to a fight for its very existence. It was no doubt the beginning of such a situation which largely suggested to the German Gas Association, at their 1927 meeting, the holding of a monster gas exhibition; and the project has been worked-out, with characteristic German thoroughness, to mature on April 19 next year. It is to open on that date in Berlin, and it is to have the advantage of official assistance from a municipal department which exists for this and similar purposes.

From the Committee of Management, we have received a copy of the official programme or prospectus, which is, in itself, a work of art. It describes the thoughts which led up to the idea of holding the exhibition, the organization which has been devoted to it, and, in clear detail, the many sides of the gas industry which will be displayed. The German Association includes both gas and water engineers, and there will be a water section of the exhibition as well.

We are very grateful to the promoters for a cordial invitation to attend the exhibition, and we mention this personal matter because we are convinced that through our columns they would wish to extend a similar invitation to all who may be interested. The meeting of the German Association has been timed next year to fall within the exhibition period, but also specially on such a date as will "enable English experts to join the conference, which in recent years has unfortunately clashed with the meeting of The Institution of Gas Engineers." We feel sure that those who can make the visit will find a very great deal both to interest and instruct them, and they will find their German confrères unrivalled both as hosts and as showmen.

An item of particular interest will be a large-scale model of a modern gas-works, erected in the outer court of the exhibition hall. There will be an exhibit of oven and machine installations, and the large carbonizing units which are now the latest practice in Germany should be very instructive. In the pipes and mains section the methods of long-distance supply under high pressures will be shown. The uses of gas for domestic, industrial, and professional purposes, the development of propaganda, and all the aspects of the bye-products industry will be dealt with in detail. There is to be a special exhibit of street lighting, "ancient and modern."

We feel certain that the organizers will be glad to give any information that may be required, and, incidentally, they write in excellent English. Inquiries should be addressed to Die Leitung der "Deutsche Ausstellung Gas und Wasser Berlin, 1929," *Berlin-Charlottenburg* 9, Ausstellungs-Hallen am Kaiserdamm.

DISCUSSION ON "INSPECTION AND MAINTENANCE OF CONSUMERS' GAS FITTINGS AND APPLIANCES."

Opening Remarks by R. J. ROGERS, Chief Superintendent, Fittings Department, City of Birmingham Gas Department, at the Autumn General Meeting of the Midland Association of Gas Engineers and Managers in Birmingham, Oct. 11, 1928.

INTRODUCTION.

In opening a discussion on the "Inspection and Maintenance of Consumers' Gas Fittings and Appliances," I desire to remind you of the resolution passed at the Joint Conference organized by The Institution of Gas Engineers and the British Commercial Gas Association on Feb. 16, 1927, which was as follows:

> That in the opinion of this Conference an efficient system of periodical inspection and maintenance of the gas appliances in all consumers' premises (backed by a constant supply of gas adequate to meet the maximum demand) is essential to the permanent prosperity and future progress of the gas industry, and to the complete fulfilment of its duties to the community; and that to this end every possible facility and encouragement should be given for the education and training of the personnel necessary for carrying-out the work entailed.

I imagine that there are few gas engineers who are not in theory in agreement with the terms of the resolution; but we all know of cases where the agreement stops at the theoretical stage, and we also know that in those cases where work is being done and money spent on maintenance schemes there is no real consensus of opinion as to which is the best method of attacking the problem.

VITAL NECESSITY OF MAINTENANCE.

The future prosperity of the gas industry is dependent upon a full realization that the gas undertaking is a public utility concern. We must not be content merely to supply gas and appliances, but must take steps to see that the consumers of our gas are *permanently* satisfied with their appliances. It is impossible without some system of inspection and maintenance to ensure this permanent satisfaction.

RESPONSIBILITY.

There appears to be doubt in the minds of some gas engineers as to the advisability of embarking upon systematic inspection and maintenance lest, should an accident occur, the responsibility for it be laid at the door of the undertaking. This seems to be a timorous, if not an unreasonable, attitude to adopt. I would even go so far as to say that we fail in our duty as a public utility concern if we do not adopt means to institute a maintenance service section in our undertakings whereby we can obtain the goodwill and satisfaction of our consumers, and thereby ensure for ourselves not only a continuance, but an expansion, of our business.

We all know that in recent years the Board of Trade have in one way or another referred to the various accidents which have occurred with gas appliances on consumers' premises, and they are no doubt carefully observing the steps which the industry is voluntarily taking to prevent such accidents in the future. The industry does not seek, nor does it require, legal enactments or regulations to ensure the periodical inspection and maintenance of appliances.

There is no better way of showing our genuine desire to be of service to our customers than the establishment upon an equitable basis of some form of general maintenance; and it is far better that we should commence upon this of our own free will than that it should be forced upon us by legislation or by fear of our competitors. It is noticeable to-day that it is those towns where competition is most severe that give the greatest support to maintenance schemes. I would point out, however, that it is far preferable to start the maintenance scheme before the competition becomes keen; the edge will then be automatically taken off the competition when it does arrive.

Assuming, therefore, that we are in agreement as to the desirability of a scheme of maintenance, it would appear that what we need is a consensus of opinion as to how such a scheme may be best organized, and what its terms should be to suit the conditions which obtain in our particular undertakings.

EQUITY OF SCHEMES.

One important factor I think we must bear in mind is that any scheme of maintenance which includes free inspection and repair must be so formulated that it will not throw an undue charge upon the gas used by those consumers who do not benefit by such maintenance. In order to arrive at an equitable scheme, however, it should be possible, where two or three rates exist for various classes of consumer, to consider the needs of the classes separately. For instance, where special prices exist for automatic consumers, the cost of "free" maintenance can well be borne in mind when fixing the rate per penny or shilling; or, conversely, where a special rate has to be arrived at for users of industrial gas, no account should be taken of moneys expended on maintenance schemes for domestic consumers.

AUTOMATIC CONSUMERS.

With regard to automatic consumers, I am of opinion that the rates charged should be so adjusted as to include the cost of maintenance of appliances. That is, automatic installations should be kept in repair by the undertaking without any separate charges being made to individual automatic consumers. The class of installation, the yearly consumption of gas, and the treatment of appliances, though they may differ to some degree, are yet near enough to a common average to allow of maintenance cost charges being bulked in the gas rate without any appreciable injustice to particular automatic consumers.

ORDINARY CONSUMERS.

In the case of the ordinary domestic consumer, however, the question is much more complicated, and I am of opinion that any scheme of free all-in maintenance must put a charge upon the gas itself which will result in a measure of injustice to some such consumers.

HIRE CHARGES.

Where gas fires, cookers, or hot water apparatus are hired by such consumers, the hiring terms should be so adjusted as to cover as nearly as possible the average cost of maintenance for each particular class of apparatus. With regard to consumers' own apparatus, however, it may be agreed that a charge sufficient to cover the net cost of maintenance should be made for the service.

RETENTION OF LIGHTING LOAD.

There is another aspect which should not be lost sight of. Where the loss of a certain class of trade would result in such a fall in consumption as would possibly necessitate an increase in gas price to the remaining consumers, then it may be to the general advantage to do certain classes of maintenance at a loss if such maintenance work will assist in the retention of a sufficient volume of business. It is in this light, I consider, that all maintenance schemes designed to retain the lighting load should be viewed. This, I think, has been the recognized practice in the past; the maintenance of lighting burners being carried out at net cost, and in some cases at a slight loss.

MAINTENANCE REDUCES COSTS OF COMPLAINTS.

In considering the cost of any scheme of maintenance, it is possible to offset against actual maintenance costs some of the cost of dealing with "complaints." Every undertaking must spend a certain amount of time and money attending to complaints of "bad supply" and "no gas." In many cases notice of the trouble is not sent in by consumers until it has gone on for a long time, during which time the consumption of gas has been reduced and the consumers' opinion of the gas undertaking has been getting steadily worse. The complaint comes in often at the busiest time and necessitates a special visit of a fitter. Many of the complaints would be obviated by periodic attention to services and syphons, or cleaning and adjustment of fires. Any well-organized scheme of maintenance should show a diminution in the money spent on, and annoyance caused by, complaints.

THE LONG VIEW WHEN BUYING.

I should like to carry this question of the interrelation of maintenance and complaints a step further. Much has been said and written concerning the need for standardization of parts as far as possible to relieve cost of maintenance. Every engineer should bear this in mind when buying, and should not lightly increase the number of types of the various appliances without thought to the question of renewals. There is, however, another aspect to be considered. There is to-day a great number of shoddy gas appliances manufactured, and these could not be kept on the market if no support were forthcoming for their sale from the gas industry itself. I know it will be said that they are marketed among ironmongers and builders' merchants; but I am convinced that this field would not be sufficient if they were entirely banished from every gas undertaking's showrooms. But they are not. All of us, as we go about the country, see unsuitable appliances displayed for sale. In addition to such appliances there are shoddy taps and fittings, which are bought by gas undertakings. One or

two large gas undertakings are going to great expense in testing appliances and fittings before accepting them for use on their district; thereby preventing complaints and expense after the appliances are fixed. I do not suggest that such tests can be undertaken by everyone. Every engineer can, however, have appliances and fittings examined and reported on by an experienced member of his staff. He can buy on *quality*, and not *price*, remembering that there are plenty of firms of good reputation whose prices, though not the lowest, are strictly competitive when quality is taken into account. He should also see that that the gas supply pipes installed in houses on his district are sufficient in size, and properly fitted to ensure permanently a good supply of gas. The establishment of a central testing appliance laboratory for the British gas industry would not only ensure the use of more efficient gas apparatus, but would result, I am sure, in a great reduction of maintenance and complaint costs.

Who Is To Do the Work?

The last part of the resolution deals with the training of employees for maintenance. I gave before your Association some time ago ("Gas Journal," March 18, 1925, p. 675) an account of what we were doing in Birmingham to improve the education of our gasfitters. All that I said then holds good to-day; and we are adding to the scheme by lectures on special subjects of interest to all fitters. When I tell you that last winter 175 of our fitters and fitters' boys attended in the appropriate years of the approved scheme of instruction in Gas Fitting at the Birmingham Central Technical College, and that 51 sat for the City and Guilds of London Institute Gas Fitting Examination in its various grades early this year, I think you will agree that we are doing all we can to further the education of the fitter.

But when we embarked upon our maintenance it was early recognized that much of the work of maintenance—though requiring a certain amount of specialized knowledge—could be well done by men who had not been apprenticed to, and trained for, the gasfitting trade. In fact, the very nature of the work would render it uninteresting to the well-trained all-round fitter, if he had to do it day by day and week after week. I know that in some towns the gasfitters have objected to special men—at slightly lower hourly rates—being taken on to do maintenance work. Their argument was a reasonable one based upon the fear that in times of slackness they would be stood off or put on short time while the lower paid maintenance men would be going on with their regular duties and making full wages. This doubt was amicably settled in our case, however, by a promise that, should work slack off, fitters would have their share of maintenance work. In practice it has been found a convenience to transfer some fitters on to maintenance work during the summer months, thus enabling us to have all fires in order for the winter months, and also have a larger number of fitters available for the winter than we should otherwise be able to employ. During the past summer an average of over sixty fitters have been employed in the inspection and maintenance of installations on the premises of automatic meter users. Solid-drawn tube fittings have replaced brazed fittings, and cooker hotplates have been modernized by the fixing of new burners and top bars.

Industrial Maintenance.

The increasing use of gas for industrial purposes is bringing with it the question of industrial maintenance. In Birmingham we have for years regularly inspected all gas engines, offered advice, and when required indicated them and submitted a report. This work has, we know, kept many engines in work which would otherwise have been replaced by other forms of power. As regards industrial furnaces, maintenance can probably be best carried out by systematic inspection by a well-qualified man who will make sure that the particular furnace is giving its correct efficiency, and also that its use has not been changed over to work for which it is unfitted. The relining or re-building of furnaces is obviously not work that can be done without charge; but the undertaking should see that the services of a competent man are available for manufacturers for such work.

Maintenance Schemes in Birmingham.

In Birmingham maintenance has been developed in accord with what experience has shown meets the needs of our area, and is to-day undergoing revision and extension; but the following summary approximately represents conditions to-day:

Automatic Meters.—Meter, cooker, and fittings supplied without charge. The price paid for gas includes free maintenance of cooker and fittings.

Simple Hire Apparatus.—The hire charge is inclusive of free maintenance, replacement of fire radiants, and cooker parts.

Hire-Purchase Appliances.—Price includes free maintenance during the period of purchase (usually three years). On completion of purchase, maintenance can be continued—consumer to pay for renewals and nominal charge for time.

Consumers' Own Apparatus.—Consumer pays for materials used and nominal charge for time.

Gas Grates in Housing Schemes.—Gas grates have been fitted in the bedrooms on some of the Corporation Housing Estates. The Gas Department has entered into an agreement with the City Estates Department to clean and maintain fires and renew fuel at a fixed charge per fire per annum. One visit is made periodically each year, and other visits when required on application by the consumer.

Meters and Services.—No meter rents are charged. Old services are examined, and if necessary renewed free of charge. No charge is made for the cleaning and renewal of services, but the landlord is responsible for the reinstatement of any pavement on private ground.

Burner Maintenance.—Our lighting burner maintenance scheme provides for periodical visits to different classes of lighting installations; a nominal fixed charge being made for labour, and materials being charged for as used at ordinary selling prices.

Conclusion.

In conclusion, I will sound a note of warning to those who have as yet done little in the way of maintenance. Let your maintenance scheme be built up logically step by step. Expand its scope as time goes on, but do not embark upon a grandiose scheme for which you have neither the trained men nor the office organization. Analyze the complaints you receive, and study what business you are losing. Plan your maintenance scheme to prevent complaints by forestalling them, and to retain business by giving permanent satisfaction. I am convinced that the efficient maintenance of consumers' appliances will have an important bearing on our future prosperity as an industry, and that the utmost advantage will not be attained until all gas undertakings—large, medium, or small—carry out maintenance work on their districts.

I trust that as a result of this discussion to-day you will all endorse the resolution I referred to in my opening remarks, that we shall all derive benefit by finding out what is being done in the Midland district by various gas undertakings, and that the reputation of the gas industry for good service in this locality will thereby be further enhanced.

Discussion.

The President (Mr. W. G. S. Cranmer, of Willenhall), after having voiced the gratitude of the Association to Mr. Rogers for having brought this matter forward, went on to say that he had received the following letter from Mr. J. Ferguson Bell, of Derby, who, in consequence of civic duties, was unable to be present:

Training at Derby.

"I attach much importance to efficient inspection and maintenance. It is necessary not only to supply gas at uniform quality at a suitable pressure, but, in addition, to take means to see that consumers are using the gas to the best advantage and under conditions that will ensure satisfaction. At Derby we have recently, in conjunction with the Education Committee, established classes in practical and theoretical gasfitting at the Technical College, with the result that this class is the largest at the college. The students from this Company's employees number 45. It is very necessary to have well qualified trained men to fix appliances and attend to the requirements of consumers. In addition, during the winter, I have arranged for a series of experimental lectures in our shareholders' room on various gas appliances. I find that these lectures are helpful, and stimulate our employees to take a real interest in their work."

Forestalling Complaints.

The President (continuing) remarked that he had been struck with the point made by Mr. Rogers that the establishment of a system of maintenance might forestall complaints, and in so doing lead to a saving of both time and expense. This was an important aspect which possibly many of them might have overlooked. One of the best examples of the necessity of a maintenance scheme was the condition of the gas lights one saw in small shop windows. He had often felt downright ashamed of gas lighting in this connection. In these places cheap burners were to be seen which really never should have been made. This sort of thing did more harm to the gas industry than any electrical competition ever could do. Another point was the importance of maintaining adequate pressure. Internal pipes must be large enough; but it was just as imperative to have sufficient pressure in the streets. The minimum pressure which should be given in the streets was that which the consumers actually required. Unless an undertaking was served by a staff of intelligent men educated for their particular work, no maintenance scheme was likely to be entirely successful.

Gas Fire Maintenance.

Mr. P. N. Langford (Coventry) thought they must all have been greatly impressed by the concluding remarks of Mr. Rogers, wherein he urged that any undertaking which had not a maintenance scheme, and proposed to start one, should do it gradually, and not launch out on big plans without careful consideration. In Coventry they had nothing like such an elaborate scheme as in Birmingham; but they were going on gradually. They maintained all gas fires, irrespective of whether they were owned by the householder or were on simple hire. What they did make a charge for was radiants; the idea being that if an undertaking supplied radiants free, every time the fitter went round there would be some broken, to ensure getting a new set.

Mr. C. H. Webb (Stourbridge) observed that no meter rents were charged in Birmingham, and he would like to know what was done

in cases in which a meter was put in absolutely for a stand-by supply. Not to charge a rent in such circumstances would appear to be unfair to the general body of consumers. In this sense, he was always in favour of meter rents.

LEAMINGTON'S EDUCATIONAL FACILITIES.

Mr. R. S. RAMSDEN (Leamington) remarked that one portion of the resolution to which Mr. Rogers had referred dealt with the training of young men to become efficient not only for maintenance work, but for gasfitting generally. He would like to say how much more successful than he had ever hoped had been the educational system started in Leamington some few years ago, in conjunction with the local authority, who in the syllabus for evening classes had included as part of the programme gas and hot water fitting—particularly gasfitting. The instructors in the various classes were all employees of the Leamington Priors Gas Company—members of the technical and outdoor staffs and leading fitters. The Company made it a condition of employment now when they took on a boy that he must attend a good percentage of these evening classes. It was found that the boys did attend the classes, and took a very intelligent interest in the proceedings there. The work turned out was creditable; and members of the Education Committee who had gone round as visitors had said that they considered the gasfitting class the most promising one of the lot. The men in charge of the classes being employees of the Gas Company, the boys were not likely to idle their time away. Another plan which they had found successful was the holding of series of lectures during the winter in the showrooms. Here they arranged addresses by technical representatives of gasfitting and engineering firms with whom the Company did business, who appeared to regard it as worth their while to send people down to explain the technical details of their particular appliances. In the recent City and Guilds Examination in Gasfitting, the Company secured eleven successes out of twelve entries—the boy who failed having been for some time on the sick list. It was well worth while considering the setting-up of properly organized classes, in addition to anything the local authority might do.

Mr. E. D. WOOTTEN (Malvern) said that in his case the limit of free work was to maintain their own apparatus on hire or hire-purchase.

QUESTION OF GEYSERS.

Mr. WEBB, alluding to geysers, said his practice was to sell them for cash or on hire-purchase; but they were not placed on simple hire. The geysers were maintained during the hire-purchase period, and generally nothing happened then. If the geyser needed new burners or cleaning, they did this free; but he would like to know how Mr. Rogers dealt with the case of general overhaul and repair of privately owned or hired geysers, because the cost of such a job usually ran into several pounds.

COST.

Mr. C. M. D. BELTON (Shrewsbury) remarked that they had in a way discussed this question twelve months ago. Mr. Rogers, however, had revived their interest in it; and it was very necessary that their interest in this important section of their work should be continually revived. Mention had been made of the cost of maintenance; but it did not seem to him (Mr. Belton) that there should be any difficulty in regard to the incidence of this cost. The importance, in reducing complaints, of adequate sized mains and services and internal piping could not be too strongly stressed. The maintenance of adequate pressure was also of vital importance. His Company had been rather specializing on this side for some considerable time. He had had considerable experience with shoddy fittings. In fact, he had found it necessary to be very careful as to what was bought. The fact of whether they purchased from a cheap or a well-known firm was not alone a sufficient guide. Wherever they procured fittings, it was necessary to examine them, so as to make sure they were getting what actually was required, and not merely what the makers might put up as their best. He did not accept the estimate of makers as to the value of their own fittings—especially cooker cocks.

A TESTING LABORATORY.

It had been suggested by Mr. Rogers that it would be an advantage to have a central testing place for the gas industry. It would be a considerable advantage; and if the scheme could be extended and decentralized, it would be more useful still. As they were all aware, there was in Birmingham a very kind Gas Department, who were always ready to assist anyone in the district who might be anxious for information regarding a particular piece of apparatus; but at the same time he thought they might look forward to the provision by the industry of some organized place of reference for those who were desirous to know the truth about their materials and appliances. He did not altogether agree with the employment of semi-skilled men on maintenance work. It seemed to him rather that the best men should be put on the work.

MAINTENANCE MEN WELCOMED.

Mr. T. H. POULSON (Stafford) thought there was not much doubt that maintenance was a paying proposition to the department as well as from the point of view of the consumer. By a maintenance system, complaints were reduced to a minimum; and if the credits and debits were placed side by side, he did not think that maintenance would be found to cost very much. His maintenance men generally carried burners, &c.; and so far the small profit that was secured on these burners and mantles had been nearly sufficient to pay the men's time. They had come across many instances of services that were almost blocked and cookers that were failing to give satisfaction to consumers, who would have gone in for electricity had the maintenance men not been about just at the right time. Their maintenance scheme had been working for three or four years, and now that the consumers knew it was in operation the men were welcomed, because the consumers recognized that they were trying to help them as well as the Gas Department.

SKILLED OR UNSKILLED MEN.

Mr. H. J. WOODFINE (Wellington) expressed surprise at hearing Mr. Belton say that he thought the skilled fitters ought to be put on maintenance work. Personally, he was in agreement with Mr. Rogers upon this particular point. He found that his skilled fitters did not care to go on to such work as adjusting burners and cleaning fires. In his case it had proved advantageous to get hold of decent young men and train them, principally in the work of cleaning and adjusting burners. He had two men regularly employed on the district doing nothing but clean and adjust burners and attend to any complaints that might be made during the time they were on the round—such as a defective cooker, or something the matter with a wash boiler. They had had a maintenance scheme in operation at Wellington since before the war. Of course, during the war period it fell to the ground; but since then it had been revived and extended. Their plan was to have these young men on the town regularly, and during the summer months to put on one or two fitters who were not required for other fitting work to overhaul the whole of the geysers, cookers, fires, &c., on the district, and get them in thoroughly good order for the winter. In connection with the training of fitters, he had found it absolutely necessary to get hold of a really first-rate foreman fitter or outside superintendent. His district was away from any training centre, so that no help could be got in this way. This being so, he thought his best plan would be to pay something much more than the ordinary foreman fitter's wage, and secure a really good man. Such men were to be obtained, if one searched for them. He had picked up an excellent man, who held classes during the evening, and was responsible for the training of the fitters. The young fitters attended the classes, and were helped by the Company.

COMBATING THE SHODDY BURNER.

Mr. E. HARDIKER (Stratford-on-Avon) said he had not at the moment experienced a lot of trouble from shoddy burners; and in order to overcome the difficulty they had adopted a burner, complete with globe, which they were fixing free. This plan had met with considerable success. The scheme had been in operation only a few months; but they had already sold several gross. What the consumers did appreciate was the fact that the burners were fixed for them, which the ironmonger was unable to do. He had no general scheme of maintenance; but he endeavoured as far as possible to keep the lighting equipment of schools, &c., under his supervision. It had to be recognized that maintenance schemes cost money.

ATTENTION TO FLUES NEEDED.

Mr. F. SHEWRING (Stratford-on-Avon) said he had not at the moment a fully matured maintenance scheme in operation. He was, however, taking great care in looking after fires; and he really picked out his best men to do this class of work. It had been his experience in adopting this course that if one secured a highly competent man of good address, he invariably secured in the course of the day new business. As to shoddy burners, when he went to Stratford some years ago he decided upon using one design of burner, which was made to suit his pressure and his gas; and the business of the ironmongers and other people had become so small that it had no effect upon the undertaking. Referring to the large numbers of new houses being put up all over the country, Mr. Shewring said that the campaign which had been undertaken by the gas industry generally had no doubt influenced builders and councils to instal numbers of gas fires. In a great many cases, however, these fires, instead of being of real value from a gas-consuming point of view, were of use only for a short time, because sufficient thought had not been given to the construction of the flue. The proper construction of the flue was not by any means an easy matter. He had himself come across instances in which it was absolutely out of the question to expect these flues regularly to function properly. This was a highly important question. If these gas fires were to be of permanent value, special attention would have to be given by the industry to the construction of flues.

MAINTENANCE AND INSPECTION ABSOLUTELY ESSENTIAL.

Mr. W. M. MASON stated that the Executive of the British Commercial Gas Association had alwayst looked upon maintenance and inspection as being absolutely essential. It was no use advertising gas apparatus unless there was some definite, regular system adopted for keeping that apparatus in good, decent order. One often heard it said that a properly fitted appliance—or a satisfied consumer, to put it another way—was the best advertisement. This was, however, only a half truth. It was an essential advertisement, but it was not the best one. Other advertising was just as essential; but all the advertising in the world—and the gas industry was now spending a considerable sum on advertising—could not make up for poor appliances on the district. Inefficient, ill-cared-for gas appliances did an untold amount of harm. People who saw, perhaps, a miserable, dirty gas fire, giving the worst of service, thought this was all that gas could do. It was essential that some regular system of maintenance and inspection should be undertaken, not merely in the big places, but in the medium and small sized ones also. The question of charges always came up. Now he believed that one of the most irritating experiences in the gas or any other industry, from the consumer's point of view, was to have separate charges for everything. Mr. Rogers had an excellent paragraph on equity of schemes; but even with inequity in some respects, he (Mr. Mason) was certain that an inclusive charge was going to pay every time. There had at times been references made to the apparent attitude of the "B.C.G.A." towards gas lighting. He was convinced that all the Press advertising in the world would not retain gas for lighting against electricity; but what would retain it was a good service and a regular system of maintenance. In various places where a definite

campaign had been undertaken gas lighting was being retained, and retained with very great credit to the local people. A vast amount of testing of all forms of apparatus was carried out by the Gas Light and Coke Company at Watson House; and without saying anything derogatory, it was obvious that the fact that suppliers, particularly of fittings, knew their appliances were being tested must have a tendency to raise the standard of the apparatus supplied.

Mr. Rogers Replies.

Mr. Rogers, in the course of his reply to the points that had been raised in the discussion, said that faulty burners in shop windows made a sad sight which anyone could see in his own town. There were instances in Birmingham. How to induce users of gas in small shops particularly to take up any scheme of maintenance was a great problem. Little short of carrying out the scheme absolutely free of charge would eliminate from shop windows these badly adjusted burners. Mr. Mason had referred to the question of an inclusive charge for maintenance; and probably in principle they would all agree with Mr. Mason. He (Mr. Rogers) did, but there was a practical difficulty which they could not get over at the moment. If they once commenced—in a large works anyway—to undertake free maintenance of all appliances, they would require a staff so enormous as to be impossible to get at the present time. This was why he had stressed in his concluding remarks the need to move step by step. They would, of course, like to do it. The ideal to aim at was to take everything and see that it was properly maintained; but it must be done gradually.

Mr. Webb had put a question as to stand-by meters. So far as Birmingham was concerned, they did make a charge for such meters, when installed in connection with producer plants, electric motors, &c. They had a scale according to the size of the meter, and provided a certain consumption was not reached, the hire charge came into operation. With regard to maintenance of geysers, as mentioned in his opening remarks they did maintain geysers during the period of their hire-purchase—three years. About twelve months ago, in order to ascertain the condition of geysers which had been out on the district for five or six years—that was approximately the time when they started to put them on hire-purchase (previous to which the consumers had to pay outright)—they made an inspection, and were very agreeably surprised to find so small an amount of maintenance and repairs necessary. Before they embarked on this hire-purchase scheme for geysers, they made a large number of tests of different geysers, and prepared a specification; and all the geysers they supplied on hire-purchase had been of the same type and made of a certain strength. Up to the moment, they had not experienced any very high cost for maintenance. They did make a charge of 6s. per visit to geysers in order to clean out trays and replace any burners that required changing, and to see that the gas supply was in order; but that charge was exclusive of any large repairs which might be necessary to the geyser itself. He thought in fairness to the other consumers they must deal with the matter in this way, because they might be involved in a maintenance cost of £1 or £2.

The remarks of Mr. Ramsden were very encouraging to those of them who had advocated for many years the need for training the men who were to carry out gasfitting and maintenance work. He (Mr. Rogers) had stated on several previous occasions, from his experience extending over twenty years in the training of fitters, that he was quite certain any money spent by a gas undertaking in this work came back many fold. It was money very well spent. The great trouble with many small undertakings was to get a suitable man; and he thought, with regard to some of the members of the Association, that if they would only do what Mr. Woodfine, of Wellington, had done, and select competent men, who would take a personal and keen interest in the employees under them, such men could train a staff quite as well as could be done in the case of much bigger undertakings. Until the need for this training was fully appreciated, they would not get universal satisfaction throughout the country.

With regard to Mr. Belton's point as to trained fitters *versus* maintenance men, this again was largely a question of local circumstances. He (Mr. Rogers) knew that if they in Birmingham were to employ fully qualified gasfitters at the full rate of pay to carry out what they termed "maintenance work," it would involve the Department in a very much higher wage bill; and he doubted whether they would derive corresponding advantage from it. It depended on the type of maintenance work which the undertaking carried out. They did in Birmingham during the summer employ fully qualified fitters to do certain classes of maintenance work; and they were justified in employing them for that particular type of work, because they looked at everything in the installation from the inlet where the service pipe came into the building to the last burner tip in the house, and were absolutely competent to deal with everything they came across. But there was also quite another class of work. They had a great number of appliances of the same type which could be attended to by semi-skilled men. Such men needed to be of almost as good address as a qualified fitter; and the engineer must make a choice of suitable men even if they were not going to do the work of a fully-qualified fitter. They did find in Birmingham that their maintenance men brought in quite a large number of profitable inquiries from consumers. He was absolutely with Mr. Belton on his remarks as to cooker brasswork. It seemed to him that the greatest bugbear which they in the gas supply industry had had with regard to gas cookers was in connection with brasswork. The gas cooker had been brought up to a very high state of efficiency, but the one point that did require more attention at the hands of the gas appliance manufacturers was the brasswork. This was being considered to-day very seriously. It behoved every engineer who bought appliances to see that those parts which were likely to give trouble in maintenance—such as cocks, and that sort of thing—were of good, sound construction, and properly designed for their work. If the Department got a complaint of any sort, no matter how trivial, it involved about 3s., taking the all-in cost, to send a man to see to it; and this outlay would be eliminated if they obviated the possibility of the complaint arising. It was taking the long view once more.

As to what Mr. Hardiker had said, they had found in Birmingham also that since they commenced to give away a standard burner and fix it for slot meter users, the lighting efficiency in the houses of the prepayment consumers had very considerably increased. The Birmingham Gas Committee agreed to fix only one burner in this way, which was all they could afford to do. But it had led to the purchase by automatic consumers of quite a number of similar burners. It was not an expensive burner, but care was used in selecting it. It was made in three parts, so that the cost of maintenance had been reduced to a minimum, and it was supplied at a cheap rate.

Mr. Shewring had referred to a point which there was no time at that meeting to deal with—flues for gas fires. He (Mr. Rogers) had made a large number of experiments, and had investigated very closely this question of flues. The way in which they had overcome the trouble in their district was by establishing a New-Building Section, and it was the duty of the inspector in a particular district, when a house was put up, to see what arrangement was being made with regard to flues. In this way they were gradually eliminating what they regarded as undesirable features.

Reports of H.M. Inspectors of Mines, 1927.—The Annual Reports for the year 1927 of H.M. Divisional Inspectors of Mines relating to mines under the Coal Mines Act have just been published at the uniform price of 1s. per copy for each of the eight Divisions. The reports give a general review of the position in each Division, and in addition to valuable statistical information contain, in a convenient form, details of the main safety problems which have confronted the industry during the year, with the considered views of the Divisional Inspectors as to how many accidents or classes of accidents might be avoided. Copies can be obtained from H.M. Stationery Office, Adastral House, Kingsway, W.C. 2.

Methods of Heating and Ventilating Schools.—"What are the requisites of a good system of heating and ventilation for schools?" asked Dr. H. M. Vernon, M.D., Investigator for the Industrial Fatigue Research Board, in a paper read before the Institution of Heating and Ventilating Engineers on Oct. 9. He considered that it should keep the children sufficiently warm to enable them to reap the full benefit of the instruction which is being imparted to them. That is to say, the air must not be so cold that their hands get numbed and their feet get chilled, nor must it be so warm that they tend to get indolent and sleepy. If possible, the temperature of the air at foot level should be equal to that at head level, if not above it—*i.e.*, cool heads and warm feet are better than the reverse relationship of warm heads and cool feet, which most systems of heating tend to induce. There should be a fair degree of air movement, as moving air is more invigorating than stagnant air; and it is important that the air should not smell stuffy and unpleasant. It is desirable that these requisites be obtained with the minimum of expense, and that the heating and ventilating arrangements be of such a character that they are easily controlled, and do not readily get out of order. Hence it follows that natural systems of ventilation are preferable to mechanical systems, provided they do their work properly.

Gas Lecture at Arbroath.—"Coal Gas" was the subject of an address given to the members of the Arbroath Rotary Club on Thursday, Oct. 11, by Mr. A. C. Young, the Manager of the Arbroath Gas-Works. Mr. Young traced the history of gas manufacture, and mentioned that a good deal of attention was being paid at the present time to low-temperature carbonization. He said that the increasing use of gas in the domestic sphere and for trade and industrial purposes had already appreciably reduced the impurities evolved into the air from our chimneys, though there was still some 36 million tons of coal used annually in Great Britain for domestic purposes alone. The meeting was presided over by Mr. H. S. Hunter.

Coke Oven Gas for Accrington and Burnley.—The new coke oven and bye-product plant erected by the Altham Colliery at Moorfield, for supplying the whole of the gas required by the Accrington District Gas Board for their local consumers, has been put into operation. Hitherto, the gas both for domestic and for industrial purposes has been manufactured at the Board's works at Great Harwood; but in future five-sixths of the supply will come from these coke ovens, the Board having entered into an agreement with the Company to supply 1½ million c.ft. of gas per day for ten years. This will practically mean the closing-down of the works at Great Harwood, as far as the manufacture of gas is concerned, but there will be compensating advantages in the avoidance of further capital expenditure at Great Harwood, and additional employment for the colliers at Moorfield. The type of ovens erected is known as the compound regenerative, and the patentee is Carl Still, of Westphalia, Germany. The plant has been constructed by Coke and Gas Ovens, Ltd., licensees for this country, and nearly all the machinery used is of British production. The Company have another agreement with the Burnley Gas Committee for the supply of 1½ million c.ft. of coke gas per day, for ten years, to the Burnley Corporation. This will involve the erection of an additional 18 ovens at Altham. Other important arrangements are being negotiated.

DISCUSSION ON "GAS UNDERTAKINGS' INSURANCES."

Opening Notes by Mr. A. S. FOSTER, Engineer, Manager, and Secretary of the Stourport Gas Company, at the Meeting of the Midland Association of Gas Engineers and Managers on Oct. 11, 1928.

In introducing the question of insurance, as far as it relates to gas undertakings, I am not attempting to give anything in the nature of a paper on the subject. Nor shall I touch the question of the rates or premiums paid for the various kinds of insurance, for this is purely a matter each undertaking settles for itself. If, however, members would like to introduce this into the discussion, I see no reason against it.

I am going to make a few observations leading up to definite questions on which I should like the opinion of members present. You will see, therefore, that my object is to seek information, and, in doing so, to give what little I know on the subject.

Fire Insurance.

First of all, we must accept, and keep in mind, one cardinal principle in dealing with this kind of insurance—viz., no one who insures must do so in such a way that he is better off after a fire than before. We will take for comparison a gas-works of (say) 100 million c.ft. output, and we will assume the capital value of the works and plant is £40,000. Compare with this (say) a textile factory costing £40,000 for the buildings and machinery. It is obvious that in the latter case the owners should insure for £40,000; and in case of fire wiping out the whole of the factory and its contents, they would recover £40,000, and even then be worse off than before the fire, owing to dislocation of business, &c.

Now, should a gas undertaking with a works costing £40,000 for buildings and plant insure for this full amount? If so, should the insurance be for a lump sum of £40,000, and, in case of fire, be reimbursed by the insurance company by that amount which can be agreed upon, being arrived at by the usual average clauses? In contradistinction to this, should all those parts of a gas-works where the risk from fire is negligible be left out entirely from any covering for fire insurance? These particular parts referred to are (say) (1) underground gasholder tanks, (2) certain boundary walls, and so on according to the particular works. Before any part is scheduled out from fire insurance, explosion risks should be borne in mind.

Then, if certain parts are particularly scheduled and cut-off from any insurance, should the remainder be insured for a lump sum, and the value of any damage arrived at by average? Or should each building and each piece of apparatus on the works be separately assessed, and set out on a schedule and plan attached to the fire policy? If this latter method is adopted, what general principles should be followed in setting out the schedule? I think it is recognized that one of the dangers on a gas-works is in connection with gas storage. One of the finest insurances lies with the management in having the gasholders kept under close supervision, thus depending on themselves in this matter and not too much on an insurance company.

As a corollary to over-insurance, mentioned early in this section, we must guard against under-insurance, because of the effect of the condition of average. I suggest to this meeting that the basis of all figures for fire insurance should be the replacement value, and not the actual cost, as the greater part of buildings and plant were installed pre-war.

Consequential Loss Insurance.

Correlated with the question of fire insurance is the question of consequential loss. Should a gas-works be so unfortunate as to have a fire which throws the works out of action for several months, the consequential loss might be far greater than the actual damage from fire.

The items usually covered for consequential loss are:

(1) Net profits.
(2) Standing charges.
(3) Increase in cost of working, such as expense of temporary premises, extra labour, laying temporary gas mains, &c.

This insurance could be taken out to operate for 3 months, 6 months, or 12 months, with premiums accordingly; the short periods being paid for at a higher rate. By insuring for consequential loss it would make the payment of dividends more certain for that particular year. Before leaving the question of consequential loss, could any member state what could be done in the way of consequential loss insurance to cover for the loss, disorganization, &c., which would ensue if the books and records of a gas undertaking were destroyed by fire?

Workmen's Compensation.

A gas undertaking's chief work is to make and supply gas, but, in doing this, numerous kinds of work are carried out by the various employees, and these various classes of work are sidelines to the actual gas-making. A policy covering for workmen's compensation should therefore cover for every class of work done, including erection and dismantling of plant, meter repairing, cooker cleaning and repairing, main and service laying, cleaning public lamps, window cleaning, &c. Extra premiums are usual for holder painting and repairs, and chimney repairs are not covered at all in the ordinary policy. This class of work, though, is usually given out to steeplejacks.

As you all know, there is a great difference in the rates of premiums, between fire insurance and workmen's compensation. The latter may range, in rate of premium, eight to ten times as much as the former. Therefore the question arises, in the case of very large undertakings, whether it is not better to become their own insurance company, and establish a special fund for that purpose. This idea could be particularly well developed in the case of large corporations, who could develop a fund to embrace all their various departments, such as gas, electricity, water, sewage disposal, roads, tramways, bus services, and so on. The smaller undertakings must rely on an insurance company for this class of insurance. There would be too great a risk otherwise.

It is imperative to know exactly what a workman's compensation policy covers. An insurance company does not as a rule expound the policy it issues. The onus is on the party taking out the insurance; and it is just as well to be sure, rather than sorry, and have to fight out the true interpretation of a policy before arbitrators, or, perhaps, further still. We all take it that the ordinary employee of a gas undertaking is covered for workmen's compensation. What about the manager? This deserves close attention by all of us. In our revision of insurance, this point will be very carefully considered, and very likely a special accident policy will be taken out to cover for anything that may happen to me in the course of my duties with the Company.

It may be well worth while to consider using an insurance company to provide in due course for staff superannuation. Some of the larger undertakings have their own superannuation scheme, but small undertakings have had to leave this subject alone, owing to the difficulty of finance. By means of yearly premiums it ought to be possible to provide for staff superannuation to become operative at a certain age. If any of the members are doing anything in this matter, all information they can give will be welcomed.

Third Party Risks.

Suppose a steam roller or a large motor vehicle breaks a gas main, the gas gets into the adjacent premises, and causes death, or fire, or explosion, who is responsible? I should like enlightenment on this point. It has always been considered that a gas company's responsibility ended at the meter outlet, and the consumer's responsibility began at this point. Though legally this may be the position to-day, conditions have so changed in recent years, owing to gas companies undertaking the piping of houses and fixing all kinds of gas-consuming apparatus, that I do not think any company can afford to undertake third party risks which may develop through the work of its own employees on consumers' premises. For a small premium a comprehensive policy covering all the risks I have mentioned should be possible, and this possibility of heavy damages lifted from the shoulders of the management. Remember that an insurance company, in this particular matter, has its own organization of experts for defending any particular claim; but if a gas company, which is often considered to be fair game for anyone to shoot at, has to conduct its own defence, it may be landed in hundreds of pounds in law charges, even if it wins.

It is the usual thing for a gas undertaking to insure for third party, where they own motor vehicles. They cannot afford to do otherwise. I think the following risks should also be covered for third party:

(1) Employees using bicycles in the course of their work.
(2) Third party risks taken during and after mainlaying and service laying operations.
(3) Third party risks involved through fractured gas mains and services.
(4) Third party risks involved through the work of gas company's employees on consumers' premises, irrespective of whether the work is on the inlet or the outlet of the meter.
(5) Third party risks involved through faulty or alleged faulty gas apparatus.

Short Term Insurances.

It may often be found advisable to take out a short term insurance to cover for workmen's compensation and third party risks combined, in connection with a particular job which may be a little outside the ordinary routine of business. This can often be done for a nominal amount.

Fidelity Guarantee Insurance.

There is no need for me to dwell on this. Each undertaking no doubt settles this according to its own circumstances.

In these few words, I have only introduced the question of insurance; but this was all I set out to do. Insurance can be

carried to the extreme, but I do not think any of the matters I have mentioned could be put in that category.

In concluding, I would mention that I look on the taking-out of insurance in the same light as I should the purchasing of any other commodity on a gas-works. In the case of "insurance" we are purchasing "security," so the first and important thing to look at is the "safeness or reliability of the security" we are purchasing. The premium paid for this security is a secondary consideration.

All information members can now contribute to this subject will be welcomed, particularly by myself, as our insurances at the present time are under revision.

Discussion.

The President said there was quite a lot of information in Mr. Foster's opening remarks. He had received a letter from Col. George S. Eunson, of Northampton, who expressed regret at being unable to be present, and went on to say:

Practice at Northampton.

"We are insured under the Workmen's Compensation Act for all our workmen. We are insured for fire for the offices, stores, and workshops at the works. For motors, the whole of our cars and lorries are insured in the usual way.

"We have lately taken out a policy for third-party risk. We did this in order to cover ourselves in case of an accident happening to one of our holders. As you know, there have been several in the last few years in various parts of the country, and we are covered for £100,000, to cover damage done to property and persons other than our own workmen. It also covers a third-party risk for our fitters working in the town.

"I know there are various opinions as to whether this last insurance is necessary; but my Directors felt that the risk was such as warranted the small expenditure."

The President added that, in the case of the Company he represented, they had been insured for a number of years against third-party risks; and it was not so long ago that they had found it a really good investment.

Separately Scheduling Every Section

Mr. C. M. D. Belton (Shrewsbury) said he thought Mr. Foster deserved their thanks for bringing forward the matter in the way he had done. In connection with fire insurance on the works, Mr. Foster asked whether this should be in a lump sum, or whether each building and piece of apparatus should be separately assessed and set out on a schedule and plan attached to the policy. He (Mr. Belton) thought it was absolutely essential that the insurance should be specified separately for the various sections. ["Hear, hear."] A lump sum would be quite useless, because of the negotiations necessary under the average clause. His own fire policy for the works covered also explosion risk as far as the works themselves were concerned; but the third-party, or public liability, insurance was a matter which had been forced upon them only recently. He had had such a policy in force for three years. It was quite comprehensive, and was, he thought, a valuable type of insurance. It covered them for any damage occurring through mishap on the works or district for which they might be held either partly or entirely responsible. The premium was quite a reasonable one. A sum of £10,000 for any one accident was a fair insurance. He agreed that the basis of figures should be replacement values, as near as could be ascertained, in taking out the policies. With regard to workmen's compensation, it should be easy to get every type of work covered in one policy. They had had no difficulty in this connection. Their experience in the matter of accidents, however, had been somewhat unfortunate in comparison with some people. They had not had many; but there had been some which were rather costly, with the result that the premium was a very heavy one. The National Gas Council had a scheme arranged with Lloyd's underwriters. His Company had not seen their way to go in for that; but if one's experience was anything like average, the advantage of joining in such a national scheme of insurance seemed to him undoubted. Fidelity guarantee insurance was also very necessary, though fortunately he had not had to take advantage of its provisions. Fire insurance of the contents of showrooms was requisite; and boilers needed insuring. His Company also had a policy in connection with their own railway wagons. Their total insurance, including State insurance, cost them 0·824d. per 1000 c.ft.

Mr. A. Bird (Bromsgrove) said his undertaking had everything insured separately.

Mr. P. N. Langford (Coventry) agreed that it was absolutely essential that every section of the works should be separately scheduled and marked on the plan, as well as the contents of the buildings, and so forth. Mr. Foster suggested at any rate large works considering their own insurance. His (Mr. Langford's) undertaking tried this many years ago with regard to the Workmen's Compensation Act. They started a fund, and paid in the same rate per cent. as would have been charged by an insurance company. They went on for some time, and then became rather frightened. They had one good year, and then two bad ones; and so they reverted to insuring with a company. He was not covered for third-party risks outside on the mains, &c.; but it was a point that was well worth consideration. Fortunately the matter had not arisen with him so far.

Need for Adequate Insurance.

Mr. J. Paterson (Cheltenham) mentioned a case which had come to his notice, and which, he said, might happen to anybody. An explosion was caused by certain action on the part of a gasfitter in the employ of a large undertaking not in that district. The case was fought by an insurance company against the gas undertaking, and he was among the expert witnesses. Heavy costs were involved; and this was the sort of thing it was desirable to insure against. It was a case of inadvertence; and much greater damage than actually resulted might have occurred. His late Company did insure against this.

Mr. H. J. Woodfine (Wellington) stated that until recently his Company were covered for every risk except third-party; but following on the trouble at Manchester, he thought it essential to bring the matter before the Board, who had taken out a third-party policy with Lloyd's underwriters. He might say that the wording of the policy was not very satisfactory. He had quite a lengthy correspondence with them; and they told him that he was perfectly right in bringing the question forward, but that the National Gas Council had approved of their policy. On this letter being presented to the Board, they accepted the policy. They had quotations from tariff offices; but the one firm from Lloyd's was considerably less, and as they were insured with them in the matter of Workmen's Compensation, they took out the policy with them. In connection with any trouble that might arise on a consumer's premises by reason of a fault on the part of the workmen, they were covered in all respects as to this; but of course what they had in mind at the time was risk from a gasholder accident or escaping gas from a main broken by a steam roller finding its way inside premises and causing an explosion.

Mr. Langford asked if any member had an insurance with regard to consequential loss. He did not know of any, but the question had been raised by his City Treasurer. His own opinion at the time was that the risk was so vague that he did not think it worth covering. He would, however, be interested to know if any one present had such a policy.

Lamp Columns.

Mr. T. H. Poulson (Stafford) referred to the insurance of lamp columns. He said he found lamp-posts were knocked down during the night by motor lorries, and in the morning the lorry had gone.

Mr. Langford: You should cover your costs.

Mr. Poulson: If you can find the lorry.

The Hon. Secretary: Even if you do find the lorry, they hand it to their insurance company, who will perhaps offer you one-half of the cost, though in the end you may get the whole amount. Mr. Foster's remarks will set us all looking up our insurances; and we have to thank him for that.

Insurance of Electrical Plant.

The President raised the question of the insurance of electrical plant, which, he said, he believed was carried out in some cases. His own Company considered the matter a few months ago, but decided for the time being not to take any action. Personally, he was rather inclined to think it would be money well spent. It was not so much that one wanted to recover anything. The main point about electrical plant insurance was that one got inspection by men accustomed to that work; and if they obviated a breakdown in this way, it would be all to the good. Insurance policies did not always cover, unless specially mentioned, all cases of employer's liability. In the matter of gasholder painting, for instance, he found he had to pay a small extra premium, because it was not covered by the general policy. The same thing held good as regards dismantling of plant. If it was not work which was in the ordinary routine of a gas-works, it was not covered. As to explosions, he had had a case in which a main was damaged by a mining subsidence, and the gas got into a house, with the result that an explosion took place, and they had a bill for £100 for the cost of putting the house in order. Eventually the insurance company settled it for £10.

National Gas Council.

He had invited either Mr. Fottrell or Mr. Ogilvie, the Joint Managers of the National Gas Council, to attend the meeting; but they had been unable to do so. He had, however, received a communication from Mr. J. W. Smith (the Secretary of the Council), in which it was mentioned that at the commencement the National Gas Council concentrated on the question of Employers' Liability under the Workmen's Compensation Acts; and as the result of a questionnaire which was sent out to all members of the Council, it was ascertained that this particular risk in respect of the gas industry was considerably lower than the rates being charged by tariff offices. Apparently the gas industry had never been treated as a separate and distinct risk, but had been included with other industries where the risk was exceptionally bad. A number of insurance firms were approached, and were asked to submit schemes of insurance based on the actual risk involved. The schemes submitted were very carefully examined by a Committee set up for the purpose; and it was ultimately decided that that submitted in respect of policies issued by Lloyd's would offer the most favourable terms to members of the Council. The scheme was recommended to members, and by its adoption a very considerable saving in premiums was effected.

Mr. Foster's Reply.

Mr. Foster remarked that very likely some small undertakings would find that their fire insurance was in bulk. His own Company's was when he went to them, and he had had to separate everything out—each building and each piece of apparatus—and set it all down on the plan, so that they might know exactly where they were. Gasholder tanks were not insured. The usual fire insurance policy had a clause setting forth that explosions were not covered; but for gas-works there was usually a clause inserted which did cover them. He also insured coal, which covered spontaneous combustion. It went in with the rest.

Mr. C. H. Webb (Stourbridge): And coke as well?

Mr. Foster: In our case, no. The important point I want to mention is that, if the place is insured in bulk, the condition of average is going to apply. If everything is separated and the average cut out, you are safer.

WALES AND MONMOUTHSHIRE INSTITUTION AT PORTHCAWL.

A Group Outside the Esplanade Hotel, Sept. 27, 1928.

Front row (left to right): Mr. Charles Pike, (Exeter), Mr. F. Boardman (President), Mr. Octavius Thomas (Secretary), and Mr. Alfred Harrison. Back row (left to right): Mr. F. Hill (Usk), Mr. R. J. Auckland (Cardiff), and Mr. J. H. Canning (Newport).

["*Western Mail*" *photo.*

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

ANNUAL MEETING.

The Annual Meeting of the Association took place at Rochdale on Oct. 6, when about ninety members assembled at the gas-works main office, and were received by the Gas Engineer, Mr. H. Shewring, and the Chairman, Councillor R. H. Holt. Under the guidance of Messrs. Mellor, F. N. Booth, W. Bramhall, and Whitehead, the party were then conducted over the works. The carbonizing plant there consists of Glover-West and Woodall-Duckham verticals. The calorific value of the gas sent out is 475 B.Th.U. per c.ft., and during the year ended March 31 last 2,686,873 therms (565,657,500 c.ft.) of gas was sold to 27,370 consumers.

Following the tour of inspection, visitors proceeded to the Town Hall, for the business meeting, which was held in the Council Chamber.

The PRESIDENT (Mr. H. J. Hailstone) called upon the Hon. Secretary (Mr. J. Alsop, of Bolton) to read the annual report, which showed the number of members this year to be 251 (including 3 hon. members), which is an increase of 19 on the previous year.

The HON. TREASURER read the statement of accounts, which were received and adopted.

ELECTION OF OFFICERS.

President.—Mr. H. J. Hailstone.
Senior Vice-President.—Mr. F. B. Small.
Junior Vice-President.—Mr. H. C. Applebee.
Hon. Secretary.—Mr. J. Alsop.
Hon. Treasurer.—Mr. I. H. Massey.
Hon. Auditor.—Mr. F. A. Collier.

The following members were duly elected to the Council: Messrs. H. P. Lupton (Liverpool), C. H. Bamber (Bolton), T. Reynolds (Blackpool), and J. Carr (Stretford).

A vote of thanks to the retiring members of Council was proposed by Mr. F. N. BOOTH (Rochdale), and seconded by Mr. CARTER (Liverpool).

Mr. BATTERSBY (Bury) responded.

Mr. H. P. LUPTON remarked upon the great success that

THE MANCHESTER JUNIORS AT ROCHDALE.

had been attained by the Lancashire District Education Committee, of which their Secretary was the Hon. Secretary.

The President said that he wished to move a special vote of thanks to Mr. J. Alsop, who had worked so hard in that capacity.

Mr. Buckley (Manchester), a member of the Education Committee, also spoke in very high terms of the work done by Mr. Alsop.

Mr. Alsop thanked them for their appreciation.

Welcome to Rochdale.

The members then left the Council Chamber and assembled in the large hall for tea.

Alderman Bryning (Deputy Mayor) apologized for the Mayor, who was not able to be present on account of illness. He gave the party a hearty welcome to the town. In Rochdale, he said, they were very proud of their gas-works, which were now most up-to-date; and they were highly satisfied with the continued growth of the Department.

Councillor Holt (Chairman of the Gas Committee) commented on the valuable services the President of the Association rendered the Gas Committee. They were very proud of the fact that Mr. Hailstone had been elected the President.

Alderman Clark also spoke in very high terms of Mr. Hailstone's work for the Gas Department.

Mr. H. Shewring (Engineer and Manager to the Rochdale Gas Department) said he was very gratified when he heard of Mr. Hailstone's election. He (the speaker) was sure that their new President would do great credit to the office.

Mr. G. Dixon (Lancaster) expressed hearty appreciation of all that had been done for them as an Association by the Rochdale Gas Committee. Having referred to the value of Mr. Hailstone as a member of the Association, he asked the Chairman to express on their behalf their good wishes to the Mayor for a speedy recovery to his normal health and strength.

The resolution was seconded by Mr. Cook (Warrington), and supported by Mr. T. Duxbury (Oldham).

Presentation to Past-President.

Councillor R. H. Holt was then asked to present to the Past-President, Mr. F. B. Small, a framed photograph of the members of the Council during Mr. Small's year of office. This he did, complimenting the recipient upon the manner in which he had conducted the business of the Association.

Mr. Small expressed his thanks.

The members then adjourned to the Council Chamber to hear the

PRESIDENTIAL ADDRESS

of H. J. Hailstone, A.M.I.Chem.E.

It has been the custom of your previous Presidents, in opening the session's programme, to acknowledge in a few words their appreciation of the confidence shown by the members; and now, in my turn, I too would ask you all to accept my sincere thanks for the trust you have placed in me. Each succeeding year brings wider responsibilities to the Junior Gas Associations; and I shall do my best to maintain the high standard to which you have become accustomed, and to omit no duty which devolves upon me in the name of this Association.

In my address I propose to deal with a number of points of interest which, though possibly lacking in novelty, are not without importance; and the first of these is, of course, the Gas Education Scheme, which was so thoroughly criticized during its early days. The constructive policy put into practice is now bearing fruit; and though the past year's entrants under the Scheme were not as numerous as was desirable, it is hoped that the next few years will show ample justification for the efforts of the various individuals and committees that have contributed to the organizing of this important unit of the industry. The Education Scheme, I would remind you, exists for the Juniors—it is our scheme—and the various District Committees are laying themselves out to assist the earnest and the ambitious in obtaining a knowledge suited to the modern requirements of our growing industry. It is our duty to make ourselves familiar with the workings of the Scheme, not only for our own sakes, but also in order to be in a position to advise younger colleagues to whom the Scheme may be of possibly greater import. In urging you to do your share in pushing the Scheme in the best interests of our profession, I would remind you that our Secretary, Mr. Alsop, deals with all preliminary inquiries in this area, and is in a position to answer officially most of the queries likely to arise.

The rigorous course of study may easily occupy seven years of a young man's spare time; and only the best will stay the course. Such training, coupled with an aptitude for wise leadership and sound judgment, should assuredly lead to a position of some eminence in the industry.

Need for Responsible Men.

In the normal process of development, all industries are making greater demands on the responsibility and initiative of the junior officials; and here lies the great opportunity for advancement for all who aspire to success in works control, management, and administration. In giving advice to young men in business Viscount Leverhulme recently said "the tendency in modern business is towards devolution of responsibility. If those directing business are to have any time for creative thought, they must pass on more responsibility to those below; and the great chance in industry to-day is for those who, above all else, will accept responsibility. The men we want are those who have in their mental make-up that most valuable power of being able to accept responsibility, and not be continually referring matters to those above them, men who act on their own initiative, and have faith in that initiative."

In common with all other big industries of these days, the gas industry tends towards mass-production in manufacture, and co-operation in advertising and sales development. Thus we find that smaller undertakings are being absorbed by the adjacent larger ones, with a view to reduction in overhead costs, economical buying of raw materials, and cheaper gas supply and service.

The quality of advertising adopted has undoubtedly improved and is well up to modern commercial standards. This necessary feature of present-day trading can, of course, only be successfully developed on co-operative lines throughout the whole of the industry.

On the technical side a spirit of frankness has always existed, and in the sharing of information we can claim to be without rival in any branch of industrial activity. This is all to the good, and, so long as adequate criticism is not restricted, will ensure steady progress in the technique of manufacture and the disposal of our main products.

So far as the operative is concerned, we have moved with the times, if not indeed in advance. Conditions of labour with modern equipment present few undesirable features. The human outlook is very well considered within the industry, and the desirable vogue for co-partnership has no stronger

THE PRESIDENT,

H. J. Hailstone, A.M.I.Chem.E.

Mr. Hailstone was educated in Birmingham, and became Demonstrator in the Chemistry Department of the Birmingham Technical College. After ten years' experience as Chemist and Assistant Works Manager to a large firm of tar distillers and chemical manufacturers in the Midlands, he entered the gas industry as Tar and Ammonia Works Superintendent and Chief Chemist to the Gas Department of the Rochdale Corporation. He holds full technological certificates for Gas Engineering (Medallist), Coke and Bye-Products Manufacture, and Tar Distillation, and the National Gas Exhibition's 1st prize (1923). He is an Associate Member of the Institution of Chemical Engineers, and a Fellow of the Chemical Society, and is well known to most of our readers as a contributor of many original technical articles and reviews on all phases of the industry.

advocate than the industry we serve. With such characteristics, our industry cannot fail to contribute further to the welfare of the community, and we who are in its service may reasonably feel proud of an honourable vocation.

Gas Prices.

The business of gas manufacture and distribution, though a century old, still experiences "growing pains" which indicate a healthy, vigorous, and adaptable organization. Growth has been in no sense automatic, and has been achieved only through effort in the past. In spite of the fact that gas is a medium for producing light and heat at a cost lower than most other alternatives, complaints are frequently made by manufacturers and potential users of gas appliances that gas prices are too high, and that a huge field of further development awaits the advent of cheap gas. This is a matter that deserves close analysis. To be permanently successful, any business, including that of gas supply, must be developed by the application of ordinary sound economic principles, its welfare must finally rest upon economic foundations; and whether that business is

controlled by private individuals or groups for personal gain, or by municipalities as a public service, the same general economic laws apply. Personal or political factors may often appear to interfere with the working of these principles from time to time, but, in the long run, it is the comparative value of the service rendered by the commodity which determines the price at which the commodity may be successfully marketed. Thus the price at which gas sales may be developed is affected by the price or quality of alternative fuel or power services, and by the economic level of the community; but in the disposal of any utility any reduction of price is accompanied by extended sales—in other words, the volume of gas business is largely dependent upon the charge made for it. This fact has always been recognized; and the production of cheaper gas has been the objective of gas managers for three generations or more.

WHERE THE MONEY GOES.

It will perhaps not be unprofitable at this point to consider further this question of cheaper gas. Basing the following upon the working results of seven Metropolitan and Suburban Gas Companies for the year 1927—which represents about one-third of the gas supply of England and Wales—of the money paid by the consumer for his gas, approximately one-fifth was used in buying fuel (less residuals), a quarter went in manufacturing expenses, a further quarter for distribution, and the balance provided for management expenses, payment of rates and taxes, and provision of profits. These proportions differ in individual cases, but as an illustration of the factors involved we may utilize the quoted figures.

If we consider what part the Junior may take in the reduction of these figures, we shall see that in only one direction may radical lowering of price be looked for. So far as oil and coal are concerned, it is unlikely that appreciable reductions will occur, though the problems of transport still receive attention, and their solution will help. Continuous vertical retort practice, giving greater yields per ton, has reached a high level and makes for economies, but we have it on the authority of the Chief Engineer of the Gas Light and Coke Company that little economic difference exists between modern vertical and modern horizontal practice.

SCIENTIFIC SELECTION OF COALS.

Scientific selection of coals has now become a fine art; and no matter what type of plant is in operation, it is desirable that the most profitable coal be used. This is not necessarily the best grade or even the lowest in price, but that mixture which gives the greatest return in value of suitable gas and products for a given expenditure on material and manufacture under the local conditions. Such is "economic efficiency" as distinct from "technical efficiency," which may sometimes prove a somewhat expensive ideal. The principle of scientific control of industrial operations demands an exact knowledge of all the factors involved. Hence the scope of our studies ever expands, and for every problem solved we usually find that several fresh ones emerge into the light of our newer knowledge. The comfortable and easy bliss of ignorance gives place in a healthy industry to a stimulating wider wisdom essential to economic progress. Every advancement in knowledge and technique thus brings with it an added responsibility and calls for wider knowledge and broader experience, if the benefits of our industrial training are to be made available to the public we serve.

The selection of the most suitable coal mixture is a matter for very careful consideration and research on each works; and the developments of the last decade have not simplified the study, for as we learn more and more of the special qualities desired in our products, and of the mechanism of the various changes occuring during the carbonization and steaming of the coal charges, we have simultaneously to readjust and re-interpret our results as market prices for raw material and finished products vary. You have seen for yourselves what we have attempted to do at Rochdale in this respect; and though our test plant has been at work only a short time, we feel that the information obtained will eventually provide a sound basis for coal selection.

CARBURETTED WATER GAS.

Turning to carburetted water gas manufacture, during a ninety-year period of evolution have arisen the "up-and-down-run" system, the "back-run" system (which you will have the opportunity of seeing at Warrington next February), waste-heat recovery, and, finally, automatic control; and we find to-day a number of instances where gaseous therms are produced at a price comparable with that of coal gas, and with a corresponding thermal efficiency. During 1927, however, the gaseous therms produced from oil appear to have amounted to only about 5 p.ct. of those produced in "straight" coal gas.

No startling changes in the principles of tar distillation or ammonia recovery have appeared in recent years, but from the financial point of view the extension of co-operative tar distillation has benefited many non-distilling producers. The outlook for sulphate is indeed black, and the troubles of effluent disposal make the position acute. Mechanical improvements have been introduced into the sulphate manufacturing process which make for almost automatic action. The next few years will probably bring about the inauguration of new principles of ammonia recovery; and these developments are awaited with interest. The grading of coke continues to receive attention.

TECHNICAL CONTROL.

Reverting to the manufacturing expenses of gas production, absorbing in the instance quoted a quarter of the revenue from gas sales, the tendency has been to lower the carbonizing wages bill, in spite of higher wage rates and reduced hours of labour. This has resulted from progress in plant design and technical process control. The elimination of wastage of effort and material in all sections of the industry has been one of the most fertile fields for the activity of the junior official, who is, in the nature of things, usually in closest touch with the plant and its operatives.

In order to keep a hand on the "pulse" of the plant, adequate indicating and recording instruments are a prime necessity, and as an aid to regularity of operation are valued by conscientious workmen—foremen and staff alike. That has been our experience at Rochdale; and the various recorder charts you have seen provide a good example of a system which is very strictly supervised by our management. Such a system pays for itself many times over, and ensures adherence to prescribed conditions on the works and often gives warning of irregularities which may be rectified before becoming serious. The question of minor economies on the works' is one for individual treatment. When in doubt, it is always safe to consider what one would do if one's own money were involved in the operation—a test which rarely fails. The cost of performing the various operations on the works should be one of the first considerations; and in these days of adequate works accountancy no junior need be kept in the dark regarding the costs of the items coming under his particular sphere. The effect of minor economies may appear insignificant on the price per therm of gas, but in the case of an undertaking of (say) the size of Rochdale, 0·01d. per therm represents about £110 per annum—an item very well worth attention. Conversely, it will be appreciated that a considerable amount of effort is necessary before the price of the gas is materially affected.

STUDY THE DETAILS.

An instance has recently been quoted where a saving of 1 lb. of producer fuel per 100 lbs. of coal carbonized was equivalent to a gain amounting to a quarter of the total carbonizing wages. This is only one of the many instances that could be given to illustrate the scope of technical control. The manufacture of gas—a chemical engineering operation—requires for its successful development a staff adequate both in numbers and technical proficiency; yet most gas-works are still technically understaffed. The standard of qualification set by the Institution may be of a high order, but the status of its younger members will benefit accordingly only as their achievements on the works result in financial and economic gain. Our industry cannot afford to carry "passengers," and each junior must prove his value by his personal attainments on his own works. In time, the freer use of the technician will be a recognized means to economy, but I fear the public opinion which largely governs gas undertakings has still to be moulded in this direction. Reduction of expenditure in industrial operations is a simple matter; but if developments are not to be restricted, good management implies wise spending, and, having spent, efficient control. Good plant in the hands of a good staff will give good results; and whatever our position in the scheme, we can all do our share in the achievement of the ideal.

DISTRIBUTION COSTS.

Turning to the next item of expenditure—distribution—taking up almost a quarter of our gas-sales income, we find that this factor has increased year by year. Labour and materials cost more, while the personnel of supply and sales departments grows as the degree of essential service is extended. A feature of recent years has been the more thorough costs analysis of statistics on this side of the industry, throwing light upon problems of considerable significance. This line is still capable of general extension, and there is good scope here for technical men not afraid of figures and practical difficulties to develop a branch towards which the industry's attention is increasingly being turned. The problem may be resolved into three main sections:

(*a*) Supply systems (including measurement).
(*b*) Utilization (design, efficiency and maintenance of appliances).
(*c*) Policy.

The juniors on the supply side must be prepared to follow and put into practice the technical developments so rapidly arising.

With regard to the item I have termed "policy," discussion may, or may not, be within the scope of a Junior Association; but though we may not be immediately concerned with its determination, we are involved with putting it into practice. For the moment let me defer this question.

The remaining item of gas costs includes rates and taxes, management, and profits; and the only definite means of reducing such overheads is by extending our sales. This brings us back to where we started, and to the vital problem with which we are all so intimately concerned. Cheaper gas is de-

pendent on larger sales, and larger sales can only result from cheaper gas or better service.

To return again to the matter of policy, it is well known that the legislation under which our industry has laboured has tended to restrict development in several ways, and little sympathy appears to have been given of late by the Government. In the interest of the general public, vital amendments are necessary if further injury is to be prevented. Various proposals, largely concerned with financial matters and reforms, are being worked out by the National Gas Council—proposals connected with facilities for amalgamations of undertakings, the operation of the sliding-scale, the raising of capital at economic rates, the method of charging for gas, and many obsolete limitations. A revision of the existing system of gas charging is essential in order to obtain new and remunerative business which could not otherwise be acquired. The flat-rate system is, moreover, undoubtedly inequitable in its application. To remedy this, a number of systems have been put into operation in this country, and very extensively in America, where legislation does not restrict the industry to the same degree. The "two-part tariff" makes a fixed charge to cover standing charges, and a further low-rate charge for the gas consumed. The "three-part system" gives a similar benefit and additional relief for larger consumptions. Experience in America indicates that this more rational system of gas charging has been one of the main factors in contributing to the success of the industry in face of severe competition. In considering the cost of supplying gas to consumers, it is clear that:

(*a*) The amount of expenditure required for manufacturing plant is dependent on the maximum daily load.

(*b*) The cost of the distribution system will depend upon the maximum hourly load.

(*c*) The individual service costs are almost identical for each customer.

(*d*) The cost of the gas used is proportional to the amount.

With these items considered, a true cost of supply can be worked out for each type of customer on an equitable scientific basis.

The value of the industrial load cannot be over-emphasized, as one good industrial consumer may be worth hundreds of ordinary ones.

Votes of Thanks.

Mr. Applebee moved, and Mr. Young (Burnley) seconded, a vote of thanks to the President for his address; and the President's reply concluded the business of the day.

MIDLAND JUNIOR GAS ASSOCIATION.

Presidential Address of Mr. F. Caudwell, of Shrewsbury.

The Opening Meeting of the session of the Midland Junior Gas Association was held in the Council House, Birmingham, on Thursday, Oct. 11—Mr. H. R. Hems, the retiring President, being in the chair.

A cordial welcome was extended from the chair to Mr. C. M. D. Belton, of Shrewsbury, and Mr. E. Caudwell, father of the new President, Mr. F. Caudwell, the Distribution Superintendent to the Shrewsbury Gas Light Company.

New Officers.

Mr. A. R. Myhill (Central Laboratory, Nechells Gas-Works) becomes Senior Vice-President, and Mr. W. Macnaughton (Wolverhampton) has been elected Junior Vice-President.

Owing to pressure of business, Mr. W. L. S. Spinks, of the Birmingham Gas Department, has relinquished the office of Hon. Secretary, and Mr. H. C. Wills (Central Laboratory, Nechells), who acted as Assistant Hon. Secretary, succeeds him.

Mr. Geo. W. Smith was re-elected Hon. Treasurer, and Mr. W. P. Timbrell Hon. Auditor; and Mr. J. H. Wainwright was co-opted to the Council.

Eleven new members were elected.

Mr. Hems congratulated members of the Association on their successes in the recent examinations in connection with the Institution Education Scheme. The past year, he remarked, had been to him one of considerable interest. It had been a year of service, and he warmly acknowledged the team work rendered by the members of the Council. All were animated by a desire to further the work of the Association. In inducting the new President, Mr. Hems pointed out that Mr. Caudwell had given efficient service on the Council, and had contributed papers of technical interest.

A hearty vote of thanks was passed to Mr. Hems.

PRESIDENTIAL ADDRESS

of Mr. F. Caudwell, of Shrewsbury.

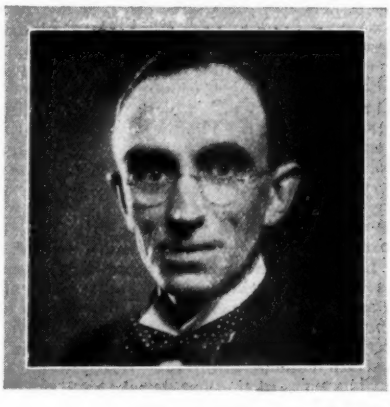
First of all I must express my sincere appreciation of the high honour which you have conferred upon me. Seven years ago, I came as a stranger to the Midlands, and I have vivid recollections of my first attendance at one of our meetings. I shall always remember the kindness and courtesy which was extended to me then, and which has continued, culminating in my election to the office of President. I thank you cordially for the confidence which you have shown in me, and assure you of my best efforts during my year of office to merit that confidence.

At the close of last session, the membership of our Association stood at 239, 27 new members having been elected during that period. This growth is a healthy sign; and I trust it will continue. I suggest that we should set ourselves the task of reaching a membership of 300 before the end of this session. Not that I believe the success of the Association should be considered from a numerical standpoint only. We should concentrate upon attracting to our ranks those who are seeking to possess qualifications necessary for advancement in their individual spheres of operation.

I have always looked upon Junior Associations as being preparatory to the Seniors. The only qualification in the past has been keenness for self-improvement; but with the inception of the Institution's Education Scheme, this keenness should find practical expression through applicants for membership seeking to qualify through the Scheme.

Students' Session.

Last year, your President suggested a students' session; and in the circumstances, I feel it would be well if this was continued. The programme drawn up by your Council would favour that course, and it is hoped you will find it as interesting, and the results as beneficial, as those of the past.



THE PRESIDENT,
F. Caudwell, of Shrewsbury.

Mr. Caudwell was educated at the Ipswich Secondary School, and in 1903 commenced a five years' apprenticeship in the distribution department of the Ipswich Gas Company. From 1908 to 1913 he served with the Gas Light and Coke Company, and in the latter year took up an appointment as Chief Inspector with the Exeter Gas Company, in which capacity he acted till 1920. He was then appointed Distribution Superintendent to the Shrewsbury Gas Light Company—which position he has since held. Mr. Caudwell holds the City and Guilds of London Institute Certificates in Gas Engineering and Gas Supply.

For the young man who has ambition and the necessary energy, there is in these days no lack of facilities for self-improvement. He can receive advice on the course of education he should pursue. His interests in this direction are catered for by the industry he serves; and if he can conveniently associate himself with a Junior Association, he will find that he will be further assisted by the interchange of ideas and experiences. In no industry is such a degree of versatility required as in our own; and speaking as one who started at the bottom of the ladder, and at that time had to map out my own scheme of education, I am extremely gratified to note the progress of the Institution's Education Scheme. It demands the whole-hearted support of all those in responsible positions; and every effort should be made to interest the young men of to-day, who are the seniors of the future. In our own area, valuable work is being done by the District Sub-

Committee, who are ever eager to help all those who apply to them.

Growth of Gas Sales.

The Board of Trade Return relating to gas undertakings for 1927, shows an increase on the previous year in gas sales of 3,632,915,000 c.ft., equal to 1·3 p.ct. This is less than the increase of 1926 over 1925, which was just over 4 p.ct.; the difference being probably due to trade depression. The latest Electricity Return available relates to the year 1926, and shows that the total sale of electrical energy in that year was 5,606,100,000 units, an increase of 11 p.ct. on the year 1924-25. These comparisons are interesting. They show the necessity for virility on the part of all those who serve the gas industry, and indicate that the utmost should be done to ensure that young men of the right quality are encouraged to enter the ranks and so increase its capacity for dealing with competition. Adequate remuneration, however, must be assured; otherwise the benefits of the Education Scheme will be reaped by other industries.

Application of Psychology.

I sometimes feel we are not sufficiently careful in selecting suitable candidates, and that efficiency in the long run would be gained by submitting applicants to psychological tests. The advantages of this system were clearly demonstrated in the war, when America subjected those who entered the Army to these tests, with gratifying results. In England the work of the National Institute of Industrial Psychology is growing. In 1926, 600 children of the London area, on leaving school were given vocational advice based on tests directed by the Institute, and information was obtained in 161 cases, which showed that 103 had obtained employment similar to that recommended to them, and 58 otherwise; no dissatisfaction being expressed by those in the former group. Generally, the application of psychology is extending; it has been proved conclusively that greater efficiency and output have been obtained after careful examination of various processes and of the people concerned in them. From a perusal of our Technical Press, it is certain that this subject is receiving attention by our own industry; and I am in complete agreement with Mr. A. W. Smedley, Secretary of the Manly Gas Company, Ltd., who in a recent paper to the Australian Gas Institute—see "Gas Salesman" for June 27, p. 149—said: "I venture to suggest that the day is not far distant when any man who will count in this or in any other industry will be a careful student of psychology."

Education of the Public.

While we must educate ourselves, and ever seek to explore new methods of manufacture and distribution, the education of the public must also advance. It is extraordinary in these days to discover the number of people who are entirely unaware of the service which gas can offer; and this ignorance can only be overcome by taking advantage of every opportunity of personal contact, and by the use of interesting and attractive publicity.

With regard to lighting, gas may be said to be holding its own. While there may be certain conveniences attached to the use of electricity for this purpose, the outstanding advantage of gas is the quality of the rays of light emitted, and their effect on vision; and the public must be made aware of this advantage.

With regard to heating, the subject is inseparably bound up with ventilation; and just as gas has had to meet the keen criticism of coal-fire users, so will electricity. There is a tendency in parts of the country to cut down building costs at the expense of efficient heating and ventilating arrangements, and to dispense with any heating whatever in some rooms. This development has received attention, and will have to be strongly condemned. Architects, too, countenance the putting-in of undersized flues with badly placed outlets, which can only lead to dissatisfaction and play into the hands of our competitors.

In connection with cooking, considerable advance has taken place on both sides. While the electric cooker must be admitted as more efficient, the price per unit in most places is such that it is a more expensive appliance. Also from the point of view of utility and reliability, it is second to gas. I believe, however, that the externally heated gas oven will be more employed in the future.

The Industrial Load.

It is not every company that has a large industrial load, or, indeed, one of any size. Those companies possessing this load are fortunate. Their output, though, is closely bound up with any fluctuation in the industrial conditions; and in the event of a transfer of an industry from one district to another, the business of such undertakings suffers, and losses have to be made up. While the use of gas in industry was extended considerably during the war period, it was curtailed at its termination; and it is questionable whether, except in a few cases, sufficient energy has been put forward to build-up again the consumption of gas for industrial purposes.

Those concerned with this section must possess business ability, together with a knowledge of metallurgy, chemistry, physics, etc., and be able to approach the manufacturer tactfully. The demonstration room is more than desirable. Failing such facilities, however, experimental work can be done on the manufacturer's premises, if one feels sure that it will lead to good business. As far as my experience goes—the quality of output remaining the same—the decision as to the type of fuel to use is not always based upon its price; other features enter into consideration. We have at Shrewsbury a large furnace employed for plate heating purposes, consuming 1800 c.ft. per hour at its maximum. It is placed in a modern factory which is well laid out and clean in appearance. Electricity is generated on the spot at a very cheap rate. The load, however, on this furnace is intermittent, so that it would not have paid the Company concerned to use their own generating plant. On the other hand oil would disfigure the premises, and there was the expense of additional storage, so that ultimately it was decided to instal gas, which is supplied at 10·8d. per therm, *less* 12½ p.ct. discount.

Price, however, does enter seriously into many cases; and unless the cost per therm can be brought sufficiently low to compete economically with other fuels, the industrial business, as far as I can see, will pass to other competitors for the time being, if running cost is a deciding factor.

Water Heating by Gas.

Coming to the question of hot water supply, large quantities of gas are employed, and will be used in the future, for this purpose. Concerning this section of our business, there has, to my mind, arisen a situation which may affect the economics of distribution. It should be remembered that in many districts mains have been laid for a number of years, and that, with the extended use of gas, they have become inadequate.

There are doubtless many cases where business has been

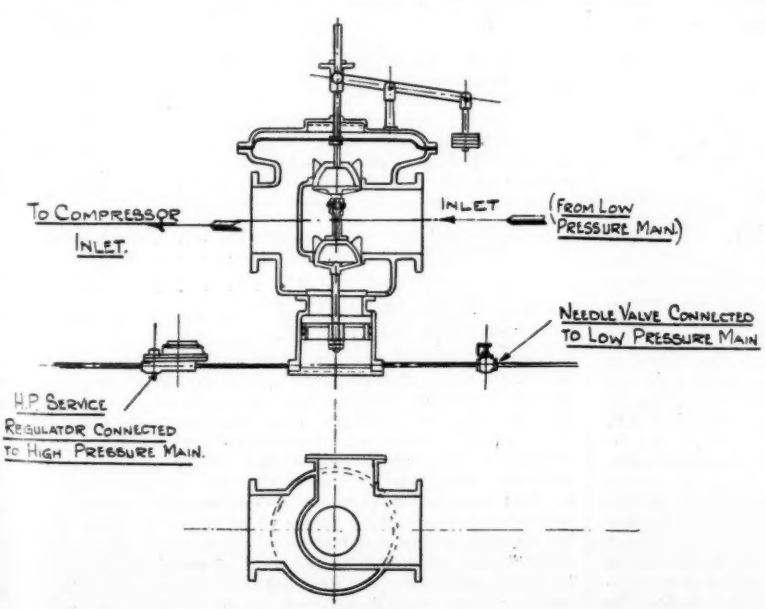

To Compressor Inlet.
Inlet
(From Low Pressure Main)
Needle Valve Connected to Low Pressure Main
H.P. Service Regulator Connected to High Pressure Main.

Fig. 1.

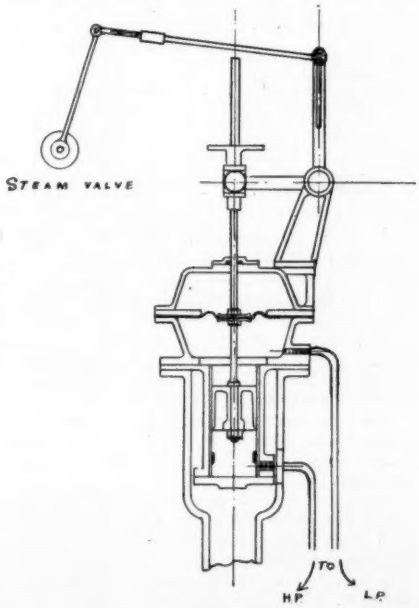


Fig. 2.

Location of Main.	Distance.	Size.	Labour, including Cartage and Reinstatement.	Material.	Total Cost.	Cost per Yard. Labour.	Cost per Yard. Material.	Total Cost per Yard.	—
	Yds.	In.	£ s. d.	£ s. d.	£ s. d.	s. d.	£ s. d.	£ s. d.	
Works to Tankerville Street	766	6	418 17 9	552 9 2½	971 6 11½	10 11	0 14 5	1 5 4	C.I. and steel, including 3-in. governor and chamber
Tankerville Street to Canon Street	300	6	151 0 9	287 19 10	439 0 7	10 0½	0 19 2	1 9 2½	C.I., including 3-in. governor and chamber
Canon Street to Abbey Foregate	339	6	172 0 9	324 14 6½	496 15 3½	10 2	0 19 6	1 9 8	Steel, including 6-in. governor and chamber, and special connections
H.P. governor, Gay Meadow	..	7	80 5 6½	139 0 11	219 6 5½	..	..	..	Includes connection to 12-in. main, 8-in. governor, and chamber
Abbey Foregate to Moreton Crescent	309	7	294 3 8½	376 11 7½	670 15 4	19 0	1 4 4½	2 3 4½	C.I., including governor and chamber, and special connections
Ditherington to Sentinel	526	6	252 11 4	368 0 1½	620 11 5½	9 7	0 14 0	1 3 7	Steel, including 4-in. governor and special connections
Sentinel to Harlescott	1200	6	797 13 2	562 2 7	1359 15 9	13 3	0 9 4½	1 2 7½	Steel, including 6-in. governor and chamber
Alterations at the works	..	..	128 9 6	123 6 9½	251 16 3½	..	..	..	C.I.
			£2295 2 6	£2734 5 7½	£5029 8 1½				

pushed to such an extent that means have had to be adopted to boost-up existing supplies; or mains have had to be re-laid, with resultant high expenditure which tends to keep up the price of gas.

The present-day slogan of instantaneous service may b expensive and uneconomical from the industry's point of iew. For years, the instantaneous type of apparatus has given good service, but in many cases this business, I think, has been at the expense of heavy charges for large services, meters, and internal pipes. If, therefore, the consumption of gas for this purpose can be spread over a period of twelve or twenty-four hours, and hot water stored until it is required for use, this would seem to be a much better method of dealing with the problem, and the responsibility for continuity of supply would be borne by the consumer. If water is boiled in two stages—first a rise to 140° Fahr., then finally, by separate apparatus, to boiling point—the economics of the problem would seem to be distinctly improved.

Distribution at Shrewsbury.

Since taking up my appointment at Shrewsbury, we have been faced with the problem of boosting; and considerable expenditure has been, and is being, incurred in order to give efficient supplies. In the circumstances, I thought that I could not do better than give you details of our experiences.

Like most other towns, Shrewsbury has grown considerably during the last few years, and a large number of new buildings have been erected, both by private enterprise and by the Local Authority. The population at the moment is 32,500. The following particulars are interesting as indicating the progress of the Company:

Year, 1921.	Year, 1928.	Increase.	Increase, P.Ct.
(1) Consumers—			
Auto. . . . 4687	Auto. . . 5629		
Ord. 3497	Ord. . . 3465		
Total . . 8184	Total . 9094	910	11
(2) Gas sales, excluding public lighting—			
214,799,000 c.ft. . . .	278,000,000 c.ft.	63,201,000 c.ft.	29
(3) Consumption per consumer—			
26,200 c.ft.	30,500 ,,	4,300 ,,	16
(4) Consumption per mile of main—			
4,104,000 c.ft. . . .	4,643,800 ,,	539,800 ,,	13

Description of Compression Plant.

Having detailed the mains extensions carried out at Shrewsbury during the years 1921 to 1927, Mr. Caudwell went on to describe the compressing plant. The increased pressure, he said, is given by horizontal steam-driven rotary compressors in duplicate, made by the Bryan Donkin Company, Ltd., of Chesterfield. The engines are of 30 to 35 B.H.P. each—the cylinders being 12 in. in diameter, and the stroke 12 in.—and they are supplied with steam at 100 lbs. per sq. in., which can be increased to 120 lbs. if required. The compressors take 28 H.P. each, so that there is surplus power available. Each can be set to pass 50,000 c.ft. per hour at 108 R.P.M., against 5 lbs. pressure.

Owing to the close proximity of the mains and town governor to the plant, difficulty was at first experienced with oscillation of the latter and, consequently, the pressure on the district surrounding the works. To overcome this, the 12-in. inlet main was lengthened, and a container installed, consisting of a cylinder 5 ft. in diameter and 9 ft. high. In addition a 12-in. diaphragm anti-fluctuator (fig. 1) was fixed on the inlet main.

The arrangement, I believe, is unusual, as resort is had to automatic loading by means of gas under pressure. Originally, the governor was fitted without the dash-pot at the base. The plant is not continually at work, but is started at 7 a.m. and shut down at 11 p.m., and these circumstances called for adjustment of the anti-fluctuator each time the plant was started up or shut down. To overcome this, a dash-pot was fitted to the base, in which works a plunger attached to the main spindle. To the underside of the plunger is connected a pressure supply controlled by high-pressure governor, and from it is taken an outlet pipe to the low-pressure main. This is controlled by a needle valve set to allow a small quantity of gas to pass into the low-pressure side. The pressure in the dash-pot is at present 25 in. of water, and remains so whatever the increase in the pressure on the outlet of the governors.

The method of governing the speed of the engines is shown in fig. 2. Gas at the higher pressure is introduced to the underside of an accurately fitted grooved plunger working on a spindle in the cylinder. The top of the spindle is connected by lever arms and connecting rod to the inlet steam valve, and is arranged so that, in rising, it reduces the quantity of steam allowed to pass into the cylinder. Any gas escaping past the plunger is conveyed to the low-pressure side. By addition or removal of weights from the platform provided, the speed of the engine may be controlled to give any pressure up to 5 lbs. on the outlet of the compressors.

Maintenance.

The whole of the plant, and the distributing mains and governors, have worked exceedingly well, and no trouble whatever has been experienced beyond the accumulation of minute particles of rust on the valves of the governors. This was easily overcome by the inclusion of a dust trap in the connections. We aim at keeping a pressure of 40-tenths on the outlet of the majority of the governors; and there is no difficulty in doing this. A portable recording gauge is fitted in each governor chamber, and charts are fixed daily, which are returned to the distribution office early each morning, so that should anything be wrong immediate steps can be taken to rectify it. Each governor is overhauled and cleaned quarterly; the total annual cost of labour for maintenance purposes being £124.

The capital expenditure on boosting mains and plant is set out in the table above, which also gives the cost per yard for laying. The expenditure of £5029 8s. 1½d. is increased by the cost of compressors and anti-fluctuating valve (£1079 10s.) to a total of £6108 18s. 1½d.

	£ s. d.
Interest on this amount at 6 p.ct. . . . . =	366 10 0
Plus cost of maintenance yearly . . . . =	124 0 0
Total	£490 10 0

Dividing this by the number of consumers (9094) the cost per consumer works out at 1s. 9d.

A vote of thanks was passed to the President on the motion of Mr. C. M. D. Belton, seconded by Mr. Macnaughton. The author, said Mr. Belton, had shown thoroughness, and had presented his facts fully and with clearness. Mr. Caudwell had done splendid work at Shrewsbury in connection with the education of young apprentices, &c. They had now practically attained what they set out to do—viz., to give every district in their area of supply a constant pressure during the day, which was an essential factor to be borne in mind when endeavouring to give satisfaction to consumers. An undertaking could not do too much in the way of satisfying its consumers by selling efficient apparatus and following-up the sale by good service; but such endeavours were of little use without a supply of gas at constant pressure and of uniform quality.

SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).

Opening Meeting of Session.

The Eastern District of the Scottish Junior Gas Association opened the session of their twenty-fifth year on Saturday, Oct. 6, at the Gainsborough Hall, Edinburgh, when a paper by Mr. F. J. Dent, B.Sc., of the Department of Coal Gas and Fuel Industries, Leeds University, was presented to about thirty members.

THE NEW PRESIDENT.

Mr. E. L. FARQUHAR (Kennoway and Largo) occupied the chair at the outset of the proceedings. Having referred to the support he had received during the last session, he vacated the chair in favour of the new President, Mr. R. J. Gavin (Kirkcaldy).

Mr. GAVIN extended his thanks for the honour conferred upon him, and assured the members that with their support he would endeavour to uphold the dignity of the Association. His first duty—namely, to hand the customary memento to the immediate Past-President—was a pleasant one. He considered that this was a fitting climax to the duties Mr. Farquhar had performed for the Association for many years.

Mr. FARQUHAR, who received a barometer suitably inscribed, returned his thanks.

Mr. GAVIN, continuing, urged the members to go forward with their classes under the Institution Education Scheme. He referred briefly to the work of the Scottish District Education Committee, and expressed appreciation of the consideration given to the individual applications which came before that body from time to time. He was proud of the fact that members from the Eastern District had come forward during the last examinations, and of the results attained.

THE REACTIVITY OF COKE.

By F. J. DENT, B.Sc., of Leeds University.

The rate at which different cokes react with steam to give water gas has been investigated by streaming nitrogen, saturated with steam, through a column of graded coke contained in a tube, heated in an electric furnace to 1000° C. The percentage of steam decomposed was found by collecting and weighing the undecomposed steam. The remaining gas was analyzed for hydrogen, carbon monoxide, and carbon dioxide to find the quality of the water gas which had been made.

The results obtained with the different cokes vary widely—*e.g.*, taking results obtained by the Research Staff of the Gas Investigation Committee, the percentages of steam decomposed for different samples of coke are:

For a bye-product coke, Manvers Main	50·1
Vertical coke (Glover-West), Meadow Lane Gas-Works, Leeds	51·2
Horizontal coke, horizontal retorts, New Wortley Gas-Works, Leeds	60·3
Coke prepared in laboratory by carbonizing a mixture of coal *plus* 5 p.ct. Na_2O as Na_2CO_3	98·5

Cokes have been prepared in the laboratory by carbonizing finely ground coal at 500°, 800°, and 1100° C. The results for these cokes were as follows:

Coke prepared at 500°	48·2
" " " 800°	62·7
" " " 1100°	28·2

These results indicate that cokes prepared at low temperatures like 500° are not more reactive to steam at 1000° than cokes prepared at higher temperatures—*e.g.*, 800°—but both the 500° and the 800° cokes are more reactive than cokes prepared at 1100°.

The reaction between cokes and carbon dioxide was investigated in a somewhat similar manner. The steam-nitrogen mixture was replaced by carbon dioxide obtained from a cylinder of the liquefied gas, and the experimental temperature lowered to 900° C. Samples of the gas after passing over the coke were taken and analyzed for carbon dioxide and carbon monoxide. The results obtained can be conveniently expressed as the percentage of carbon monoxide in the exit gas. Again, the various cokes exhibit marked differences. Taking as examples the results obtained by the Gas Investigation Committee:

Bye-product coke, Manvers Main	5·4
Vertical coke (Glover-West), Meadow Lane Gas-Works, Leeds	6·0
Horizontal coke, New Wortley Gas-Works	10·0
Coke prepared in laboratory by carbonizing at 800° C. a mixture of coal *plus* 5 p.ct. Na_2O as Na_2CO_3	97·5

The above method was extensively modified, however, to study the reaction between cokes and oxygen. Over the coal surface a mixture of oxygen and nitrogen was streamed, and the amounts of carbon dioxide, carbon monoxide, and oxygen in the exit gas were determined by analysis. The oxygen-nitrogen mixture contained only 2 to 3 p.ct. of oxygen; this large dilution with nitrogen being necessary to prevent the temperature of the coke rising above its surroundings when the exothermic reaction between the coke and the oxygen took place.

The reaction was investigated at temperatures ranging from 300° to 800° C., and the results obtained showed that, while at low temperatures the various cokes combined with the oxygen supplied at markedly different rates, at temperatures above 700° those differences disappeared, and all cokes appeared to react with oxygen at the same rate. This result supports a theory described by Haslam in his book "Fuels and Their Combustion," where he states that at high temperatures the rate at which carbon reacts with oxygen is governed not by the chemical affinities existing between the carbon atoms and the oxygen, but rather by the rate at which the oxygen can be brought up to the surface of the carbon. This rate will depend not on the nature of the coke, but on the manner in which the oxygen is passed over its surface. This is interesting, as it means that all cokes, when at high temperatures, would under similar conditions as regards size and draught burn at the same rate in oxygen, and thus all cokes should develop heat at the same rate according to the equation

$$C + O_2 \rightarrow CO_2 + 14{,}550 \text{ B.Th.U.'s per lb. of carbon.}$$

But in a deep fuel bed, this reaction is followed by a reduction, more or less complete, of the carbon dioxide to carbon monoxide, the extent of the reduction depending on the reactivity of the coke towards carbon dioxide.

This second stage can be represented by the equation

$$CO_2 + C \rightarrow 2CO - 5850 \text{ B.Th.U.'s per lb. of carbon,}$$

and it is seen that this reaction absorbs heat. Thus, the greater the amount of carbon monoxide formed in the fuel bed, the less will be the heat available for heating up the surroundings; or, in other words, if air be blown through two fuels, one of a coke which is reactive towards carbon dioxide and the other of a coke which is unreactive, it would be expected from the above considerations that the highest temperature would be attained in the fuel bed of the unreactive coke.

Laboratory experiments have been carried out which support this view. Ten grammes of coke ($\frac{1}{8}$ to $\frac{1}{10}$ in. mesh) were packed into a tube of about 1 in. internal diameter, and heated up in an electric furnace to 700° C. Air was then passed through the fuel bed at a rate of 50 litres per hour; the temperature of the coke column being followed by a thermocouple embedded in it.

The temperatures attained were:

	°C.
Beehive coke	980
A coke prepared in the laboratory at 800° C.	940
A 5 p.ct. Na_2O coke prepared at 800°	870

Of these three cokes, the beehive coke was the most unreactive, and the coke prepared from a coal admixed with 5 p.ct. Na_2O as Na_2CO_3 was the most reactive towards carbon dioxide. Thus it is seen that the highest temperature was attained in the case of the most unreactive fuel.

Another property which has been studied has been the ease of ignition of various cokes in oxygen. This property is important, as will be pointed out later, in cokes which are to be used as domestic fuel.

For example, quoting results obtained by the Gas Investigation Committee:

	Ignition Point, °C.
Bye-product coke, Manvers Main	531
Vertical coke (Glover-West), Meadow Lane Gas-Works, Leeds	456
Horizontal coke, New Wortley	467
Low-temperature coke prepared at 500°	330

The results indicate that cokes prepared at low-temperatures have lower ignition-points than those prepared at high temperatures. It was also found that a coke prepared in continuous vertical retorts had a lower ignition-point than a coke made in horizontal retorts from the same coal, though the horizontal coke was more reactive towards carbon dioxide and steam.

We will now consider the various methods of using coke in practice, and see how far the results of the above experiments can indicate the properties desirable in cokes used for different purposes.

THE FOUNDRY CUPOLA.

Taking first the foundry cupola—here we have a furnace whose object is to melt-down iron. Thus in this case we should use a coke which would easily give a high temperature when blown with air—namely, a coke unreactive to CO_2. If a reactive coke were used, a large amount of potential heat would be lost from the top of the furnace as carbon monoxide, and further we should find it necessary to increase the blast through the furnace in order to attain the requisite temperature. The

fuel consumption would thus increase because of both these considerations, and as a result the use of a reactive fuel would be uneconomical.

Similarly, in the preparation of crucible steels, an unreactive coke is the most suitable, and this is probably a reason why beehive coke is preferred to bye-product coke by the steel worker.

The Blast Furnace.

In the blast furnace we have more than the simple melting process of the above two cases. We have first to reduce the iron ore to metallic iron in the shaft of the furnace before it comes down into the belly to be melted. The bulk of the reduction of the ore is carried out by carbon monoxide, which is generated by the reduction of carbon dioxide by the coke in the lower parts of the furnace. For this reduction a reactive coke would appear to be the most suitable, whereas for the melting-down of the reduced ore, an unreactive coke should be the most economical, as we have seen above. Taking both considerations into account, the opinion of most investigators appears to be that an unreactive coke is desirable, as this coke will most easily give the high temperatures necessary just above the tuyeres to bring the charge to a state of fusion, and that at these high temperatures sufficient carbon monoxide would be generated to carry out the reduction of the ore in the stack.

The Gas Producer.

In the gas producer the conditions are, however, different from those of the preceding examples. Here a mixture of air and steam is passed through a deep fuel bed; the aim being to obtain a maximum of combustibles—carbon monoxide and hydrogen—in the issuing gas. In this case, obviously a coke reactive to carbon dioxide and steam will be most suitable. For a given rate of production of producer gas, a deeper fuel bed would be required with an unreactive coke, or, for a given depth of fuel bed, a reactive coke would give a better quality gas and would also stand a higher rate of working. Further, the lower temperature which would be obtained just above the grate in the case of the reactive coke should decrease the troubles due to clinkering.

The Water Gas Plant.

The working of a water gas plant is somewhat more complex. Here we have an intermittent process divided into "blow" and "run" periods. During the blow periods, air is passed rapidly through a bed of coke which, by its combustion, is raised in temperature. The air is then replaced by steam, which is decomposed in passing through the hot coke to give water gas. During the run period, a reactive coke would be advantageous, as it would give a high percentage decomposition of steam and also a low percentage of carbon dioxide in the water gas. But during the blow periods, where the aim is to heat the fuel bed up to a high temperature as quickly, and with as small a consumption of coke, as possible, an unreactive coke would be most suitable.

The Dellwik-Fleischer method of operating a water gas plant is, as you know, an attempt to get over this difficulty. In this system, a thin bed of fuel about 3 ft. in thickness is, during the air blow, heated up as rapidly as possible, by means of a powerful air blast supplied in such quantity as to burn the carbon as completely as possible to carbon dioxide, and thus avoid the loss due to the formation of carbon monoxide which takes place when a thicker bed of fuel is employed.

The efficiency of working a water gas plant with a thin fuel bed has been examined by the Gas Investigation Committee, and the results of their tests are given in their Tenth Report. These indicated that a loss, rather than a gain, in efficiency took place when thin fuel beds were adopted.

The following table gives their results for two tests—B with a fuel bed 4¼ ft. thick, and D with a fuel bed 6 ft. thick:

—	B.	D.
Thickness of fuel bed	4¼ ft.	6 ft.
Water gas, potential heat	37·17	48·58
,, sensible ,,	2·84	2·81
Steam undecomposed	5·35	2·67
Blow gas, potential heat	11·54	17·10
,, sensible ,,	9·87	7·58
Heat lost in raising steam to generator	3·18	2·71
,, ,, ,, ,, ,, turbine	5·35	3·17
Heat of steam used and lost in turbo blower	12·43	7·32
Ashes, clinker, and dust, potential heat	7·89	4·83
,, ,, ,, ,, sensible ,,	0·27	0·33
Losses not separately determined.	4·11	2·90

The figures show how the heat is distributed among the products, expressed as percentages of the total heat supplied to the generator as coke, steam, and air.

From these figures it is seen that, though the percentage of potential heat lost in the blow gases is reduced when a thinner fuel bed is used, the saving is more than counterbalanced by the extra losses due to the increased sensible heat of the blow gases, less steam decomposed, and the increased steam consumption of the blower and generator. A further important point was that the output of the plant was much decreased by using a thin fuel bed.

This diminished efficiency is explained in the report as being due to the fact that, when the thin fuel bed is blown with air at a rapid rate, oxygen by-passes through the interstices between the coke, and burns with carbon monoxide above the fuel bed. As a result, though there is a high carbon dioxide content in the blow gas as it leaves the generator, the heat which has been evolved in the formation of this carbon dioxide is not all available during the ensuing run period, as it was, in part, developed by carbon monoxide burning outside the fuel bed.

Also, during the steam run, steam by-passes similarly, leading to comparatively large amounts undecomposed unless the rate of steaming is very much reduced.

Thus, working with a thin fuel bed does not seem to be a very satisfactory solution to the problem. It is found better to generate water gas using (say) a 6 ft. bed of a reactive coke; and, in order to minimize the loss due to the unavoidable production of carbon monoxide during the blow period, the potential heat of the blow gases is utilized in carburettors and waste-heat boilers by burning with secondary air.

The Domestic Grate.

Finally, I would like to draw your attention to the results obtained at Leeds University by H. J. Hodsman and J. H. Dyde, who have been investigating the behaviour of different types of carbonized fuels in the domestic grate. The grate used was 12 in. wide, 10 in. deep, and 5 in. from back to front. The cokes were graded to pass a 2 in. and remain on a 1 in. sieve. Arrangements were made to light the fire by gas.

The percentage of the heat which was radiated into the room when various cokes were burnt in the grate was measured by the "Leeds" test. The results showed that the cokes most reactive to carbon dioxide were inferior in this respect to more unreactive cokes—*e.g.*:

	Thermal Efficiency. P.Ct.
Cokes resulting from high-temperature carbonization	32
Low-temperature cokes, processes A, B, and C	28
Very reactive coke containing approximately 3 p.ct. of Na_2O as Na_2CO_3	21

This lower efficiency can be explained as being due to the fire being at a somewhat lower temperature in the case of the most reactive cokes, due to the ready formation of carbon monoxide from the carbon dioxide generated in the lower parts of the fire.

This carbon monoxide burned in the flames above the fire. Though the same total quantity of heat is developed by the different cokes, with the less reactive fuels this heat is generated in the fuel bed, which has a high capacity for radiating heat and is raised to a higher temperature. With more reactive cokes part of the heat is developed above the fuel bed in flame of relatively poor radiating power. As a consequence, the proportion of heat radiated into the room by highly reactive fuels is reduced.

But when one is choosing a fuel for the domestic grate, other considerations, such as ease of ignition, flexibility, and cleanliness, assume perhaps greater importance than thermal efficiency. By flexibility is meant the rapidity with which a fire will burn up on replenishing with fuel after it has been allowed to die down somewhat. From this point of view, cokes resulting from low-temperature carbonization were superior to the high-temperature cokes which were tested. A fire burning high-temperature coke, though satisfactory while in operation, would require more attention—unless the fuel was consumed in a grate specially designed for the purpose—than one burning a low-temperature coke, especially if the fire was a small one.

The ease of ignition of low-temperature cokes, and also the rapidity with which combustion spreads throughout the fuel bed, are reflected in the fact that they give low ignition-points when tested, as has been described in the first portion of the paper. If high-temperature cokes could be made to resemble low-temperature cokes in this respect, their popularity among domestic users would undoubtedly increase.

Discussion.

Mr. Farquhar asked the lecturer what method was employed for the measurement of steam in the experiments described, and why sodium carbonate had been added to the coke to give the results mentioned. Also what had been done with regard to the grading of coke for domestic use, since size was an important factor in this connection?

Mr. Dent, in reply, said that the steam was measured in two ways. First by weighing the saturators before and after each experiment; and then this value was checked by noting the hydrogen content of the water gas *plus* the undecomposed steam. He added that a little hydrogen would come from the coke, but generally the results were accurate. Sodium carbonate had been added because of the greatly enhanced reactivity, and was the result of empirical discoveries. The initial experiment formed part of a group of investigations. In regard to the question on size, he said that they were studying different types of coke, but had adopted for the experiments the standard size of 1 in. to 2 in.

Mr. A. L. Duff (Granton) considered that the open fire was one of the primary reasons why, in this country, little progress was made with high-temperature coke. The latter radiated a fair amount of

heat in an ordinary firegrate; but unless careful attention was paid to it, the fire would fall away. He had tested the ignition of a fire similar in size to the one mentioned, and lighted with a gas poker. He found that high-temperature coke nuts took about twenty minutes to get properly under way, while coal nuts took about ten minutes. He had not had an opportunity of testing low-temperature fuel; but the price of this product was one of the reasons why it was not universally popular. Once it came into the market at a price competitive with high-temperature coke, the gas industry, he thought, would have to find means to gasify the major part of its coke, or experiment with blending coal in order to give a suitable coke which would compare with this competitive product. In his opinion, the ease of ignition and free-burning property of low-temperature fuel would overwhelm any high-temperature coke for the domestic market. He asked who had carried out experiments in connection with coke for domestic purposes, and where the information collected could be obtained.

Mr. DENT said that the chief investigator on the matter of domestic coke, in addition to the work carried out by Mr. H. J. Hodsman, was Dr. Margaret Fishenden, who had written a book on "House Heating," and had also published papers under the auspices of the Fuel Research Board.

Mr. D. GARRIE (Burntisland) referred to the figures given for steam decomposed, and asked whether these figures would be duplicated with the same accuracy in repeat experiments. He also inquired how the sodium carbonate coke was prepared, observing that it was a very reactive coke. Would the lecturer suggest that gas undertakings should prepare it for (say) the producers? Also, did coke similarly prepared with lime give any appreciable reactivity, and would this reactivity be swamped by the size of the coke? If smaller pieces of coke giving larger surface were used, would this result in increased reactivity?

Mr. DENT remarked that the results for steam decomposition were taken from the laboratory note book, but in repeat experiments it was certain that the figures would be the same within 1 p.ct., provided every precaution was taken to reproduce similar conditions. The sodium carbonate coke could be prepared in two ways. First by mixing the coal and sodium carbonate when dry before carbonizing; and secondly by boiling the coke in a solution of sodium carbonate, and drying. Lime had been tried, but was found to be less reactive than sodium carbonate. Reference to the Gas Research Fellowship Report for 1926 would show that Prof. Cobb and Dr. Marsden had dealt with lime. He (Mr. Dent) agreed that size was an important factor, especially in the case of gasification in oxygen. In the paper he had dealt only with the chemical aspect; and the influence of the physical properties had not been considered.

Mr. T. M. DUNCAN (Perth) recalled that in the lecture given by Dr. Marsden two years ago it was said that the use of sodium carbonate coke had had a detrimental effect on fireclay. He asked if there had been any trouble noticed in such experiments carried out recently, or if there were any changes which would enable gas undertakings to go further in ordinary practice.

Mr. DENT said that the chief difficulty in the preparation of sodium carbonate coke on a practical scale was due to the fact that it did attack fireclay in a very short time. He thought it possible that, due to the progress in the metallurgical industries, and to leaks which undoubtedly occurred when using retorts of fireclay material, they might revert to metallic retorts. Returning to the point raised by Mr. Garrie concerning the preparation of sodium carbonate coke, it was suggested that another method of overcoming the difficulty would be to quench the coke with a solution of sodium carbonate.

Mr. GARRIE then asked what amount of sodium carbonate would be found in coke after impregnation in the solution.

Mr. DENT replied that a coke with 3 to 4 p.ct. of sodium carbonate was obtained by impregnating with a 10 p.ct. solution; but a greatly enhanced reactivity could be obtained with a smaller percentage. For example 1 p.ct. had a marked effect.

Mr. W. C. SPENCE (West Wemyss) expressed the opinion that, by adding these solutions to the coke, they were going to increase its price, and this would probably affect the sale of the product.

Mr. DENT considered that the addition of 1 p.ct. of sodium carbonate to coke would not entail a higher price.

The PRESIDENT then called on the members present to express their appreciation to Mr. Dent for his paper.

SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

Meeting in Glasgow.

The Opening Meeting of the 25th Session was held in the Royal Technical College, Glasgow—Mr. ROBERT FIFE, of Kilmarnock, Past-President, presiding over an attendance of about eighty members.

The CHAIRMAN extended a hearty welcome to all members, and expressed the hope that the twenty-fifth year of the Association would be a record one. He then said how they all regretted the bereavement which had occasioned the retirement of Mr. T. F. Carswell from the office of Secretary.

It was resolved to record in the minutes of the Association an expression of appreciation of the work carried out during Mr. Carswell's term of office.

Mr. Alex. Bujnowski, of Glasgow, was appointed Secretary.

The CHAIRMAN then spoke very highly of the work which Mr. John Murray, their new President, had done during the last five years, and asked the members to give him their wholehearted support.

PRESIDENTIAL ADDRESS

of JOHN MURRAY, of Glasgow.

To-day we enter upon a notable year in the history of the Association. Founded on May 7, 1904, the first ordinary meeting was held in the Old Technical College, Bath Street, Glasgow, on Oct. 8 of the same year, so that the present session is our semi-jubilee. The privilege of being President is all the more enhanced in such circumstances, and I hope that the general work of the session will be in keeping with the importance of the year.

During the past twenty-four years, much good work has been done by the Juniors throughout the country, and I am certain that the Western District in Scotland can at least claim to have put their full quota into the pool. The officials of each succeeding year have so arranged their programme that almost every topic worthy of consideration has been under discussion. There is little doubt that those discussions have been most instructive and helpful, and I am confident that the Juniors of 1924 who hold responsible positions in the industry to-day will readily admit that the time spent at these meetings was not in vain.

THE VALUE OF JUNIOR ASSOCIATIONS.

At this point, I might be permitted to refer to the first panel of office-bearers of the Association and contrast it with their positions to-day.

President.—Mr. James Lowe, now Engineer and Manager, Auckland, New Zealand.

Vice-President.—Mr. James Bell, now Engineer and Manager, Dumbarton.

Hon. Secretary.—Mr. W. M. Mason, now Manager of the "B.C.G.A."

Council.—Gavin Munn, now Engineer and Manager, Renfrew; John W. McLusky, now General Manager, Glasgow; and Chas. Fairweather, now Engineer and Manager, Kilmarnock.

As years have passed, the Western District has given its quota to the industry; in fact, ex-members are to be found in all parts of the country to-day. The year 1928 has its junior, just like the year 1904, so that we must carry on, tackling in the same determined spirit the new problems that arise in our daily work.

I often think that in some quarters there is a tendency to

THE PRESIDENT,

John Murray, of Glasgow.

For the past twenty years Mr. Murray has been a member of the Head Office Staff of the Glasgow Gas Department, and acted as Hon. Secretary to the Western District of the Scottish Junior Gas Association for six years.

make the Junior Associations senior all at once. I do not suggest that we should not be going forward, or striking out on new and improved lines; but why should we ask for certain qualifications and certificates—mostly out of the reach of a real Junior—for membership? The constitution of this Association is so framed that any person engaged in the manufacture or distribution side of the industry is eligible for membership.

This surely includes the young men of the profession who are anxious to improve their knowledge, and, in short, endeavour to put into practice—although juniors—Article 4.A. of the objects—viz., "To devise means for helping and extending the technical knowledge of the members." Let enthusiasm be the certificate required, and good results will come along.

During my term of office as Secretary to the Association I was frequently assailed by members who held the view that certain subjects selected for discussion should be dropped because they had been dealt with in previous years. I feel sure that such members forget the ever-changing personnel of a Junior Association, and that some repetition over a course of years is bound to come, if we are to provide adequately for the young man coming forward. In the same way, visits to works of interest can with discretion be repeated advantageously. The difficulty of the Junior of 1928 may possibly be the difficulty of the Junior of 1904 or 1912.

Encourage Papers from Members.

There is frequently some difficulty in getting members to come along with papers, perhaps due to modesty or students being busy with classes during the winter. It is easy for the Council to arrange with outside speakers or prominent men in the industry to come to the meetings, but surely this is not the policy for a Junior Association to pursue. The general interest of the members will be increased if more individual members take part in the paper reading and discussions. As a solution of this difficulty I would suggest that more encouragement be given to short papers. Two or three papers of (say) 10 to 15 minutes' duration, with adequate discussion, would break new ground and engender more interest in the meetings. You will note that such an arrangement is on the syllabus for this session; and if it meets with success, I hope it may be a feature of the syllabus in years to come. Another suggestion is to have an informal talk on any subject or difficulty connected with the work. Your Council will be very happy indeed to arrange for such a meeting, where possibly younger members would feel more at ease in expressing themselves, and in this way gain confidence to take part in the open meetings. With regard to the visits, &c., why not set aside a night when members could give their observations on the particular methods or processes recently inspected? The full benefits of the visits could then be determined.

The Association is now affiliated to the Joint Council of the British Junior Gas Association. This affiliation in no way alters the Constitution of our own Association. Representatives from all districts meet in annual conference, and matters relating to the Junior movement are discussed. It is a common pool for the Junior, and I am certain will be of benefit to all concerned. We in Scotland shall be in close touch with the work and policy of our colleagues in the South; and one has only to look back at the recent negotiations with The Institution of Gas Engineers on the Education Scheme to realize the benefit of a common understanding with the respective Junior Associations.

Arrangements can be made whereby our members can obtain copies of the transactions of the southern associations and in this way be in close touch with the subjects dealt with at these meetings. I am sure good results will accrue from our affiliation.

I now propose to speak briefly on the distribution side of the industry, from the office point of view. As most of you are aware, I am not on the technical side, but I hope that my remarks will be none the less interesting.

To carry on the work of the public service in any undertaking, apart from general or expert knowledge, three important qualifications are required by the staff concerned—viz., tact, push, and principle. By a careful blending of these, consumers will more readily listen to the official point of view and will have more confidence in the staff.

The Complaints Department.

In dealing with complaints or inquiries, be polite, always let the consumer have his or her say; remember that the consumer thinks he has a real grievance. You must take two sides, and judge from the official standpoint and from the consumer's point of view. It is here that push and principle come in. You can be polite, gentlemanly, and still have the necessary push to settle many difficult problems. You need not employ any dishonourable tactics; if your department is wrong, admit it, and the consumer will think all the more of you. In short, treat your consumers as you would like your wife to be treated.

The vexed question of the gas account is one that arises daily and requires very careful handling. Here again I would suggest that the clerk should give a patient hearing to the consumer's argument; this at once will go a long way to give a measure of confidence in the department's dealings.

From my experience I would suggest that, as rates fluctuate so much, you should not discuss the account in money values only, but refer to the past record of consumptions, and compare them with the period under dispute, taking out daily averages, &c. Inquiry should be made as to the appliances in use in the house; and with your knowledge of their approximate consumption, you can generally prove to the consumer that there is no overcharge. It is not good practice simply to refer your consumer to the inspector of meters for a test; this only means expense for your undertaking. I have also found it advisable to encourage consumers to take weekly readings of their meters. They can then readily trace an unwarranted increase in gas consumption, and take immediate steps to get the matter remedied. In most cases I find this is not only an argument in favour of the department, but one acceptable to consumers.

In Glasgow, consumers can lodge a complaint or make an inquiry at the Head Office, the showrooms, or at the office of the fittings section. Cards are issued to the various sections for all classes of work in the distribution department. These cards are in classes—a complaint card for repairs and the general overhaul of appliances, and for special reading of meters dealing with changes of tenancy.

The complaints and inquiries received from day to day are many and varied, and there is no doubt that careful attention on the part of the clerk at the complaints counter will not only give quick service to the consumer, but will save expense to the undertaking. There is nothing more alarming to the average person than an escape of gas; yet, if the receiving clerk tactfully asks a few questions, he will in most cases be able to put the consumer at ease. Every endeavour must be made to localize each complaint—*e.g.*, an escape. Is the escape under control; is the escape at the meter, the cooker, the fire, or the lighting points, &c.? These queries will determine how to advise the consumer as to the use of the cranes, and will enable the fittings section to decide as to the need for a special man being sent out to the job.

Complaints of bad supply or no gas can be handled in the same way. Is the stoppage general over the property, in any one part of the house, or does the supply go down at any given time? All these questions help in finding out whether it is a street mains job or (say) a bound meter. Repeated visits can be reduced in this way, as it is very irritating to a consumer when a workman calls who cannot carry out the repair, but simply says another fitter will follow to-morrow.

Recording Complaints.

Complaints received from all sources are noted in a quadruplicate book with three tissues and a work card. The orders are all numbered consecutively. The first tissue is bound to the book, while the remaining two with the work card are perforated and go to the department concerned for attention. On the face of the card, space is provided for the name and address of the complainer, the source—say, by telephone, call, letter, &c.—the date and time received; and there is ample space to give the nature of the complaint. Space is also provided for details as to meter size and number, and a note of all appliances connected to the meter. On the reverse side, the report from the department handling the work is given. These cards are also used by the meter readers for special readings and by the mechanics who repair prepayment meters.

As each book is finished at any branch it is immediately returned to the Head Office and held for reference. This ensures that there is a record of every job; and in the event of a card going astray, an exact copy can be given.

On the completion of the work, the cards are returned to the complaints section for scrutiny and filing. The scrutiny involves not merely inspection of work done, but careful watching for what has been omitted. Careful scrutiny also ensures that your consumer has had attention, and that the chance of repeated complaint is avoided. A fitter might easily omit to note that a meter was overtaxed; he might stop an escape at a meter and forget to pass it for exchange; he might break plaster, tiles, or damage property, and take no steps to have a repair noted. A careful scrutiny of all finished repairs is therefore necessary, as an insurance against bad or careless workmanship. The full report of work done is given by the fitter, with a note of time expended, all duly certified by the inspector. The fitter must also give the particulars, in the space provided, of the number and size of the meter, and a note of all appliances attached thereto. It is the duty of each fitter to examine all such appliances when attending premises for any work. This acts as a safeguard against the chance of a fitter disconnecting a meter when a fire is in use in any part of premises, his duty being to note his meter number and all appliances connected to it. It is also the main guide as to the necessity of passing an order for a larger meter. Cards dealing with the "cutting-off" or "turning-on" of supply are forwarded to the records office, so that they may know exactly when the supply to every meter was either withdrawn or restored. This is also a guide as to tenants tampering with a supply already cut off. The clerk in each section dealing with a card must initial it, indicating to the scrutiny clerk that the section concerned has duly noted the job.

Every single card must be accounted for. Spoiled or cancelled cards are sent to the filing table at once. The finished cards are numerically filed each day. As each file nears completion, it is carefully checked for missing numbers, and a red danger card inserted at every vacant space. Pressure is brought to bear on the various sections for the return of overdue cards, and valid reason must be given for the retention of any card. As already explained, the Head Office having the complete

record of every job, no complaint or inquiry can pass without due attention. By keeping the files up-to-date, and "dangered" for missing cards, one can urge upon all the sections the need for doing the work promptly. On the other hand, where your finished work is coming in regularly and without delay, you are assured that the consumers are receiving prompt attention.

Meters and Appliances.

It is necessary to have an absolutely correct record of every consumer, with a note of the meter or meters and the appliances—free loan or hire—fixed in all premises. In any large undertaking this record is ever changing, and in order to keep it up-to-date, the records section must be posted with every change.

The records section in Glasgow is in two divisions; one dealing with supply through ordinary meter, and the other with the prepayment supply. A survey card is held for every meter fixed, containing the name and address of the consumer, the number and size of meter, the date of fixing, and a full description of every appliance—heating or cooking—whether on free loan or hire.

In order to ensure that a note is made of every change of tenancy, and the fixing, exchange, or removal of every meter or appliance, a series of application forms filter through all sections of the Head Office. Every form must pass through this records section before a "job card" is issued; and as the fittings section must get a card from the Head Office before an appliance is delivered, fixed, or returned, and as this card must return to Head Office and pass back through to records, you will see that nothing can pass without the knowledge of the records section. In fact, this section of the Head Office acts as a sieve for every order in the distribution department store. The records section, first of all, get their information with the arrival of the application forms. The forms are drawn up in duplicate, one portion being retained by the Gas Department and the other given to the consumer. This latter portion contains the terms and conditions of the gas supply or the fixing of any particular appliance. A space is provided on each form to trace the progress through each section of the office; and here the respective clerks initial and date the form, indicating attention from the section concerned. These forms are divided into groups—*e.g.*, continuation of supply where the meter is already installed, but where there is a change of tenancy; applications for new meters; new hired appliances; exchange of meters; exchange of hired appliances; or removal of appliances. Each form has a distinctive number and colour. The orders may be taken in the district, at the showrooms, or at the Head Office, but in every case they come to Head Office for registration, and go to the records section. Here the clerk compares the application against existing records of this consumer. If all is in order, the form goes to the complaints section for the issue of a job card to the workshop. You will see how important it is to check at this point, as a consumer could very easily order one appliance one day and come back within a month for another. If the order went right through to workshops without any check, the appliance would be fitted, whereas under this system the consumer can be challenged immediately, and in many cases be called upon to pay the cost of the new fitting. The same method is adopted in the issuing of these cards as with complaints; each card and flimsy being numbered and every one having to be accounted for. The card is double-paged; the face giving general instructions, the inside a note of materials used or returned, and on the back a note of fitter's time, and the report and certification by the inspector.

The job card is sent to the fittings section for attention, and the application form retained by the records section until the work is completed. The card is then returned to Head Office and compared with the application form, and a note of the appliances fixed, exchanged, or received, entered against the consumer on the "meter route card." In case of a meter job, the index of old and new meters, and the number and size of the meters, are noted from the job card. The form now travels through the various sections—ledger, machine room for new plate on addressograph, and accountant to make any charge for fitting. Each clerk initials and dates the form; and in time both form and card meet at the complaints section for scrutiny and filing. The scrutiny must be thorough. There is the danger that an old appliance may be left on the district disconnected, additional appliances may be fixed to a meter only ample for present load, time may be excessive, and material issued may not be wholly accounted for. Every card must be completely finished. The scrutiny clerk assumes nothing; he takes no risk, and consequently the chances of a bad job are considerably reduced.

The application form is also carefully examined to ensure attention at Head Office, and it is finally compared with the card; if all is in order, both are passed for filing. The forms are filed in alphabetical order of streets and street numbers, while the cards are filed in serial number. If it is desired at any time to trace the fixing, renewal, or exchange of any meter or appliance, the information can speedily be found by going to the file of application forms, and turning up the street number where the form will bear the job card number. This method of filing has proved very effective, and entails no writing-up of an index. The forms are filed according to their type, and no difficulty is experienced in tracing repairs several years old.

This short account of the clerical aspect of a large distribution section will, I hope, be not only acceptable to you, but interesting and helpful. The methods adopted may be worthy of consideration in many smaller or medium sized undertakings. The system gives a guarantee to the management that every change of consumer and every order to the department are carefully noted by all concerned. It also guarantees the speedy attention to the requirements of the consumer.

The clerical staff of the distribution department who are in daily touch with the public can do much good for their undertaking. They acquire a good knowledge of the department, and can in many ways smooth the rough places by their treatment of the consumers.

Discussion.

Mr. Fife (Kilmarnock) congratulated Mr. Murray on his address. He said it was an inspiration to all to know of the success of the early members of the Association. The suggestion of "short papers" and time for discussion was a very happy one, and he hoped that Mr. Murray would further this idea, as many members had neither time nor opportunity to prepare a comprehensive paper, yet might produce something of vital interest from their own particular work.

Mr. Lennox (Falkirk) complimented Mr. Murray on his paper. He considered it necessary that those engaged on the manufacturing side should have some knowledge of the administration or clerical side. If a mutual understanding existed between the works and distribution sides, then success was assured. He wished the new President every success during his year of office.

Mr. Scott (Glasgow) thanked Mr. Murray for his address. He considered it necessary that a large undertaking should have a reliable system of records of appliances, but that such a system must not be an expense to the undertaking. He then spoke of complaints of "no gas." He considered that often such a complaint lay in faulty services, and urged that pipes of adequate size be fitted.

Mr. R. Keillor (Greenock) considered that complaints were a healthy sign. He spoke of corrosion of service pipes. After perhaps 100 years, he said, it was not surprising if pipes gave trouble. He suggested that the question of clearing pipes, with the attendant damage to property, should be carefully considered. Often the renewal of the pipe at the outset of trouble would be the more economical proposition.

Mr. A. H. Slade (Glasgow) said it was very necessary to analyze complaints to determine their legitimacy. Complaints should be brief, yet contain all the vital matter. Complaint clerks, when dealing with the public, had the opportunity of dispelling any suggestion of inefficiency. All effort should be directed towards "satisfaction to the consumer," because they had a service which no competitor could give.

Mr. McIsaac (Glasgow) spoke of the repetition of visits, and considered this necessary for two reasons—because the personnel of the Association was ever changing, and also because the various manufacturers were constantly improving their plant. He welcomed the idea of informal meetings with short papers, and also of discussing the various points of interest at the visits.

Mr. Nicolson (Glasgow) referred to the certificates and qualifications mentioned by Mr. Murray. He asked if no "commercial" certificates were instituted, for he considered the commercial side a very important one.

Mr. A. Walker (Kilbarchan) emphasized the necessity of good workmanship and repair to damaged property. He warmly thanked Mr. Murray, and expressed his good wishes for the coming year.

Mr. Murray, in reply, thanked the members for the manner in which his paper had been received.

This concluded the meeting, and a vote of thanks was accorded to the Chairman.

WESTERN JUNIOR GAS ASSOCIATION.

First Annual Dinner.

A most successful and enjoyable evening was spent on Saturday, Sept. 29, when about forty members attended their first annual dinner at St. Stephen's Restaurant, Bristol.

The chair was taken by the President (Mr. A. Marsden), who was supported by three hon. members—Mr. S. E. Halliwell (Secretary and Commercial Manager of the Bristol Gas Company), Mr. R. Robertson (Engineer of the Bristol Gas Company), and Mr. J. Wesley Whimster (Engineer and Manager of the Bath Gas Company).

There were also present Mr. James Taylor, Engineer of the Weston-super-Mare Gas Company; Dr. M. W. Travers, F.R.S., and Prof. W. Morgan, of the Bristol University; and Mr. W. A. Andrews, of the Merchant Venturers' Technical College, Bristol.

After the Loyal Toast, Mr. T. B. Armitage (the President for the new session) presented to Messrs. A. Marsden and H. Hole the prizes given by the hon. members for the best two papers read during the session. A smoking concert followed, which was thoroughly enjoyed; the programme including items from three members—Messrs. W. Barber, S. Lloyd, and J. Malsbury.

World Power Conference.

Fuel Conference.

London, Sept. 24 to Oct. 6, 1928.

In the "JOURNAL" for Sept. 26 and Oct. 3 were published papers and discussions on the Carbonizing Industries (Sections G and H) and papers in the Fuel Utilization Sections (J, K, L). In last week's issue we dealt with Section B (the Sampling and Testing of Solid Fuels), Section O (the Transmission of Power), Section P (Waste-Heat Recovery), Section Q (Low-Temperature Carbonization), and Sections T and V (the Training of Fuel Technicians; and Fuel Organizations). To-day we conclude our report of the proceedings at the Conference by publication of the General Report and discussion on Section W (Economic Possibilities in the Better Co-Ordination of Fuel Utilization), together with Sir Arthur Duckham's contribution entitled "A Fuel Policy."

General Report on Section W: The Economic Possibilities in the Better Co-Ordination of Fuel Utilization.

By T. CAMPBELL FINLAYSON.

This Section met on Thursday, Oct. 4, under the presidency of Sir DAVID MILNE-WATSON, D.L., Governor of the Gas Light and Coke Company.

This General Report covers the two papers comprising Section W—namely:

(*a*) "A Fuel Policy" (Great Britain), by Sir Arthur Duckham, K.C.B.

(*b*) "Co-Ordination between Blast Furnaces, Coke Ovens, and the Martin Furnaces in a Metallurgical Works" (France), by C. Berthelot.

In his paper, Sir Arthur Duckham summarizes his fuel policy in the following paragraphs, which may well be taken as the basis of the present report.

(*a*) It is necessary that both the producers and consumers of fuel should avail themselves of the specialized knowledge of technically trained men. There must be understanding of fuel qualities and knowledge as to its economic utilization.

(*b*) The producers must get together to rationalize the raising and distribution of coal. Large concerns which can best avail themselves of mechanical handling and expert knowledge are in the most favoured position for reducing costs of production.

(*c*) Every effort should be made to encourage producers to supply clean coal. This not only helps the purchaser to utilize the fuel to the maximum effect with the minimum expense, but also ensures to the producer of coal a better and more secure market.

(*d*) All coal should be graded at the colliery, and, in order that the underground working costs may be reduced, modern methods for the utilization of the smaller sizes should be pursued, resulting in enhanced value of these hitherto less valuable grades.

(*e*) Post-war developments in coke oven practice have shown the economies which have resulted from the operation of large units. The best results are obtained in working units of from 800 to 1200 tons of coal per twenty-four hours in quick coking ovens, situated if necessary at a centralized position in relation to the various sources of supply.

(*f*) In many cases coke quality from a coke oven plant can be improved by blending suitable coals together. This makes it possible to carbonize non-coking coals, thus increasing the range of coals available. From blended coals it is also possible to produce an alternative to low-temperature fuel, in the form of a smokeless free-burning fuel, which should be cheap to produce.

(*g*) The surplus gas resulting from the carbonization of coal in modern coke ovens should be utilized wherever possible for industrial or domestic needs. By co-operation between coke oven owners and gas undertakings, it should be possible to arrange satisfactory conditions of supply.

(*h*) There is need of a Government investigation into the possibilities of the installation of bus mains to collect and distribute coke oven gas over long distances and large areas, such, for example, as Lancashire, Yorkshire, and the Midlands.

(*i*) The ever-increasing demands of pulverized fuel firing will lead to an enhanced value of cleaned small coals, the use of which obviates many of the difficulties associated with the process. The possible use of pulverized fuel for marine boiler work, which may lead to a reduction in demand for bunker oils, will be watched with great interest.

(*j*) In connection with the electricity grid schemes, consideration should be given to the possible utilization of the low-grade fuels, produced in the cleaning of coals for the generating of electric power in stations erected at the collieries to obviate the transport of the low-grade fuels.

(*k*) Much has been said and promised in the past concerning low-temperature carbonization, but comparatively little has yet been accomplished. The results of the energetic work which is being done in this country at the present time will be awaited with interest. The disadvantage hitherto has been the high price of the solid fuel in relation to the products from the well established high-temperature processes.

(*l*) The gas industry should pay increased attention to their coke sales. Clean coal gives a clean and easily ignitable coke. Constant quality and suitable sizing makes the fuel acceptable to the user; and every gas undertaking, by taking thought and trouble, should be able to dispose of all the coke equivalent to its gas output in its own area.

(*m*) Gas undertakings should be enabled to make such terms with the large-scale users of gas as would encourage its general utilization in industry.

(*n*) An increase in the number of combined coke oven and iron and steel work in this country would lead to economies. The installation of coke ovens near the iron and steel works provides an ideal fuel for steel furnaces in the form of coke oven gas.

(*o*) Greater financial backing to the admirable Fuel Research Organizations set up by the iron and steel industry would make its findings and development more quickly available to those in charge of operation.

(*p*) A general speeding-up, reduction of costs, and greater facilities in the transport of fuel—subjects which are being closely examined by the Government Standing Committee on Minerals Transport—will, when attained, have a beneficial effect.

M. Berthelot, in his paper on "The Co-Ordination between Blast Furnaces, Coke Ovens, and the Martin Furnaces in a Metallurgical Works," supplies some very valuable information which supplements and confirms many of Sir Arthur Duckham's suggestions. The similarity of views expressed by these two authors, who have come to their conclusions in entirely different spheres, is a striking feature of the papers.

The Value of Suitable Grouping of Blast Furnaces, Coke Ovens, and Steel Furnaces.

Both Sir Arthur Duckham and M. Berthelot advocate closer co-ordination between iron and steel works and coke oven plant. Sir Arthur considers that the best economy would

seem to be to erect coke ovens at the blast furnaces of sufficient size that the coke oven gas, together with the blast furnace gas, will provide all the heating requirements of the joint operations of coke ovens, blast furnaces, and steel works. The remaining coke required for the blast furnaces would be purchased from outside. M. Berthelot believes that coke oven gas should be used for heating the Martin and reheating furnaces, and that blast furnace gas or a mixture of blast furnace gas and coke oven gas should be used for heating the coke ovens. He shows that with modern equipment, 30 p.ct. of the gas produced by the blast furnaces is sufficient for heating the Cowper stoves. If blast furnace gas be used for electric power generation, and for heating Cowper stoves and coke ovens, and if coke oven gas be used for heating Martin furnaces, soaking pits, and rolling mills, he considers that there should be a surplus of 26·0 p.ct. of coke oven gas and 8·2 p.ct. of blast furnace gas.

The Importance of Modern Coke Oven Designs.

Both Sir Arthur Duckham and M. Berthelot emphasize the great importance of producing blast furnace coke in modern types of coke ovens. Sir Arthur states that batteries of large ovens carbonizing 800 to 1200 tons per twenty-four hours show economies of 4s. to 7s. per ton of coke over older ovens built in small units. M. Berthelot urges the use of narrow quick coking ovens on the grounds that the output of coke is greater for a given temperature in the heating flues, that there is less overheating of the coke, and that this type of oven makes it possible to produce a good coke from high-volatile coal. He states that the estimated cost of a modern plant to carbonize 2400 metric tons of coal per twenty-four hours, including bye-product plant, but excluding land, is about 74 million francs, as compared with 80 million francs for a 1920 type of similar capacity. The capacity per oven per day is approximately 22 metric tons and the output per man per day 30 tons. As regards time taken to construct modern ovens, he estimates that 9 to 10 months should be sufficient for the erection of a complete works. M. Berthelot also makes the important statement that the new coke ovens, such as those which are working in the Ruhr, do not use more than 520,000 calories per metric ton of coal with 12 p.ct. water content. (936 B.Th.U. per lb.).

Thus it will be seen that both authors stress the importance of the modern development in coke oven design in relation to the economic future of the iron and steel industry.

The Significance of Cleaning and Blending of Coals prior to Carbonization.

In stressing the importance of cleaning coal, Sir Arthur Duckham states that if all coal were cleaned to reasonable degree at the pit-head there would be a saving of £800,000 per annum in transport alone. In connection with the iron and steel industry, it is necessary that the coke should be low in sulphur and phosphorous, which in many cases involves cleaning by dry or wet processes. Undoubtedly in many cases the blending of suitable caking and non-caking coals prior to carbonization, especially if they be cleaned coals, leads to improved coke quality. The process of blending also makes it possible to utilize semi-caking or non-caking coals for coke production. M. Berthelot considers that the constituent which plays the part of the inert matter should be ground more finely than the other.

The Disposal of Surplus Coke Oven Gas.

Both authors consider that the disposal of surplus coke oven gas for industrial and domestic use requires close investigation. M. Berthelot states that a German organization (Kohlenwertung) have made plans for the annual distribution of nine thousand million cubic metres of surplus coke oven gas in the Ruhr. The main collection pipe crossing the industrial region from Mulheim to Düsseldorf is to be an 800 mm. pipe, and the pressure will not exceed 3 atmospheres. Some such scheme was probably in Sir Arthur Duckham's mind when he urges the need for a Government investigation into the possibilities of an installation of bus mains to collect and distribute coke oven gas in Lancashire, Yorkshire, and the Midlands.

A Fuel Policy.

By Sir ARTHUR DUCKHAM, K.C.B.

Authoritative Body: Technical Fuel Committee, Fuel Conference, 1928.

[Extract.]

Into whatsoever branch of the fuel question we inquire, there must be a technical understanding of the fuel to be used, and a technical understanding of its use. The old rule-of-thumb methods must go. We all have appreciated in the past the foreman or leading hand, whose long experience gave him an almost uncanny flair in judging the quality of fuel and the best way to use it. To-day not only are such men becoming increasingly rare, but the system, even at its best, is not good enough. The great need of the fuel industry is for properly trained men, educated to think at all times thermally. It will be found that such men will readily earn the good salaries they should properly be paid, by the great savings they can make. I would strongly urge that every effort be made to encourage promising men, and women too, to take up fuel work in the universities, and that fuel producers and users should give their support to such centres of education by offering openings to sound technically-trained students. All that youth wants is a chance to get on. If the demand for fuel experts is good and the pay adequate, a supply of good material will be forthcoming.

Size of Coal.

It is usual to endeavour to mine the coal as large as possible; small coal and slacks not having a ready sale. Modern methods are showing that these smaller coals have important uses, and their value will be enhanced materially. This demand for small coal will reduce the cost of underground working, and new methods of getting will be adopted which were not permissible in the past.

Coal Grading and Cleaning.

Users are appreciating the value of purchasing coals of the most suitable quality and grading for their purposes; they are also beginning to realize that the quantity and quality of ash in the coal is a very important factor in the economic operation of their processes. It is uneconomic to transport ash—a substance not only inert, but in every way injurious—from pit-head to factory or household. It has been estimated that if all coal were cleaned to a reasonable degree at the pit-head there would be a saving of £800,000 per annum in transport alone; and I would estimate that this figure could be well trebled if the other savings were taken into account, such as decreased labour, better working of fires, decreased clinker and cinders, &c.

Colliery owners are also appreciating that at home, and especially abroad, they can get a better and more secure market if they can offer a clean coal of even quality. Thus it is becoming a necessity for all collieries to grade and clean their product.

Coal cleaning was first generally introduced to meet the demands of the blast-furnace operator for coke low in sulphur and phosphorus. Wet washing was adopted and has proved efficacious and reasonably cheap, but the water content of the washed coal and the presence of coal slurry in the effluent from the washeries have been a source of trouble. These difficulties are being overcome, but their presence caused the close study of methods of cleaning by air currents. The dry method shows distinct advantages over the wet and works out lower in cost.

Grading is in general use at collieries; the efficiency of the appliances is improving, and the requirements are being met. The smaller sizes of coal command a considerably lower market price; and one of the chief problems of the colliery owner has been how to develop means for improving the market value or of treating such small coals and converting them into more valuable products.

Coke Ovens.

The smelting of iron in blast furnaces has created a demand for hard coke with as low percentages as possible of impurities, especially phosphorus and sulphur. In the past such coke ovens have usually been erected at the pit-head, and too often in such small units that economical working has not been possible. Since the war great development has occurred in coke oven practice, especially in America, Germany, and France. Silica brick has been used in construction, higher temperatures, with consequent shorter coking times, have been possible, and the output of coke per oven per day has been doubled and trebled. These improvements have also led to better yields of coke and bye-products; and, the heating being more efficient, the amount of surplus gas available has been increased. The quicker coking times have given a more combustible coke, still sufficiently hard; and though the percentage of very big pieces is less, the general size is far more even. Pure, readily combustible, even-sized coke is what the blast-furnace operator finds best for his purpose. Such a coke is the product of the modern oven.

It has also been shown that small units of coke ovens are uneconomical, and, if possible, the largest units capable of being worked by a shift of men and one set of machines should be installed at one time. With large ovens this unit is from

800 to 1200 tons of coal per twenty-four hours. Such an installation will show economies of 4s. to 7s. a ton over the older ovens built in small units. It is only a very large pit that can yield a continuous supply of 1000 tons of slack coal a day; and, in consequence, combinations of pits for the purpose of a centralized coaling and coking plant is essential. Another advantage of the quick coking oven is the fact that many semi-caking coals can now be used to make a satisfactory hard coke.

Blending.

During the last great coal strike large quantities of foreign coke were imported into this country; and though the ash content in many cases was higher than the average with British cokes, it was found that the foreign coke was more even in quality, and so gave more consistent results in the blast furnaces. Most of the foreign coke was made from a blending of coals in order to get this even quality, and undoubtedly coke makers in the future will have to study closely the problems of blending, and adopt such processes where their seams of coal vary considerably.

Some coals swell unduly in coking, and give trouble in the ovens. These can be blended with semi-coking or non-coking (and usually cheaper) coals, and improved working obtained. There is much research work to be done on these lines; and the financial results will well pay for it.

Coke made in Ovens for Other Purposes.

It has been found that coke made in ovens, suitably graded, has a ready sale for other industrial purposes and for domestic use. The low percentages of ash and water usually present in such coke make it an excellent fuel, and it will certainly become a strong competitor of anthracite for central heating and similar purposes. In America coke-oven coke is being used very largely in place of anthracite.

Another interesting development is the manufacture in coke ovens of a coke with (say) up to 6 to 8 p.ct. of volatiles, which will burn readily in an open grate with flame but no smoke. It appears that such a fuel will be a strong competitor of low-temperature fuels; the cost of its manufacture should be low, and its cleanness and hardness should recommend it to the general public. A caking coal is blended with a non-caking coal in such proportions that the resinous compounds of the caking coal are absorbed by the non-caking particles. This gives rapid coking, and provides a product which can be readily pushed from the oven while still containing 6 to 8 p.ct. of volatiles. The economy of the process depends on the availability and lowness of price of supplies of caking and non-caking coals.

Coke-Oven Gas.

Too often in the past it has not been found possible to make use of the surplus gas resulting from the carbonization of slacks in coke ovens. It has been used on boilers and for various power purposes about the works, but still too often it has had to burn to waste. Gas not being the primary product, in the older types of ovens no provision was made to keep it of good even quality. The modern oven is built to prevent leaks and to conserve all bye-products. The gas output is therefore low in inerts, of even quality, and of a very suitable calorific value for general distribution.

It immediately becomes evident that such gas should be fully utilized and the best value obtained for it. The most evident outlet is to industrial enterprises which can be suitably located near the coke ovens. I will deal with this later. The other outlet is to gas undertakings, situated within reasonable distances of the ovens, for distribution in their areas of supply. Gas undertakings operate under most stringent conditions for the supply of gas, and in the past, quite properly, have been reluctant to depend on concerns outside their own jurisdiction for the supplies, which must vary in quantity as desired, must be of absolute standard quality, and which can be as surely relied on as their own carbonizing plant in the gas-works.

The national and local economies that can be effected by making use of surplus coke oven gas have been recognized. The two sides—gas undertakings and coke-oven owners—have got together, model clauses of agreement have been drawn up, and it looks as if gas undertakings will be able to obtain a supply cheaper than, yet as constant and flexible as, their own, and that coke-oven owners will be able to obtain another satisfactory source of revenue.

There has been a good deal done abroad with the installation of bus mains to collect and distribute coke-oven gas over long distances and large areas. In Lancashire, Yorkshire, and the Midlands, we have a most favourable district for such a development. The Government should make an investigation as to the possibilities of such a proposal. A closely examined and well-balanced national scheme would do much to elucidate and meet the problems, and would provide a means for the more efficient supply of energy in the form of gas, and would result in increased prosperity to the industries concerned.

Other Coke-Oven Bye-Products.

The recent Budget must have a beneficial effect on the bye-product side of coke oven working. The value of benzole and similar light oils will be enhanced, and their increased production per ton of coal will form the subject of research. There is much to be done, and I trust joint action will be taken by the industry. Ammonia is no longer the good source of revenue that it was, but the Sulphate of Ammonia Association is doing much to popularize its use as a fertilizer.

Other Uses for the Colliery Small Coal.

The cleaning of smalls will enhance their value. The ever-increasing development of powder firing will develop the demand. Clean coal will stand longer railway freights, and the problems of powdered coal firing are lessened directly in proportion to the lowering of the ash content in the coal. It looks as if powdered coal can replace oil for firing marine boilers. The Government and the colliery owners are taking a great interest in this work, and encouraging results should soon be available. A new market could be created, and the money now sent abroad to pay for bunker oil would remain at home to assist our colliery undertakings.

Gas-Works.

Gas undertakings carbonize coal with the primary object of obtaining a gas suitable for distribution at the lowest cost. The efficiency of their operations has increased rapidly over the last decade, and in general practice an 82 p.ct. figure is obtained. This figure might be increased by a further 5 p.ct., but only by the closest technical supervision and development. The use of gas is steadily increasing, and domestic and industrial consumers are continually finding fresh benefits by turning from solid to gaseous fuel. The following is an estimate of the value of gas compared with the value of solid fuel per thermal unit for various purposes, which I put forward at the first World Power Conference in 1924.

If we roughly divide the industrial users of gas into the following three classes:

1. The industries in which the use of gas presents such advantages that cost does not seriously matter.
2. The industries in which the fuel cost is an item, but where consideration of transport, storage, ground space, labour, and the advantages given by a gaseous fuel are prominent.
3. The industries in which fuel cost is a major item,

—then I estimate that it would pay the industries to use gas, in Case 1 at a price per therm from ten to twenty times that of raw coal per therm; in Case 2 at a price per therm from five to ten times that of coal; and in Case 3 at a price per therm from three to six times that of coal.

Gas undertakings are appreciating to an increasing degree the importance of their supplies of coal. Price is no longer the ruling factor; the ash content is now closely noted, and coal is being bought on a calorific, volatile, and ash content basis. Closer working is necessary between colliery owners and gas producers; better results, and so cheaper gas, would be the outcome. The economy in the use of gas is very high, and the service that the industry has given, and is giving, to the nation is beginning to be more fully appreciated.

During the last few years gas undertakings have turned their attention especially to coke sales. It has not been appreciated sufficiently in the past that the revenue from coke is a big factor in the balance-sheet, and that this revenue can be greatly enhanced by studying the problems of preparation, grading, delivering, and popularizing coke. Clean coal gives a clean and easily ignitable coke. Constant quality and suitable sizing makes the fuel acceptable to the user; and every gas undertaking, by taking thought and trouble, should be able to dispose of all the coke equivalent to its gas output in its own area. The bye-product tar should receive closer study—supply is often greater than demand; and with a surfeited market, prices drop below its value compared to other coal products. Tar cracking should receive more attention; benzole and the lighter oils would find a constant market; and pitch coke is a commodity the demand for which would be greatly increased if there were an assured supply.

Iron and Steel Works.

It is the general policy in America and Germany to combine coke ovens with iron and steel works. This policy has not been usually adopted in this country, but the tendency is to realize that economies do result from such combination. Blast furnaces require coke, and produce a low-grade combustible gas as a bye-product; steel works require heat, preferably in the form of gas for steel melting, ingot heating, &c.; and both works require power for their various operations.

Blast furnaces do not provide sufficient low-grade gas, nor is its quality suitable for all the purposes of a thermally balanced iron and steel factory. If sufficient coke ovens are installed near the iron and steel works to provide the full quantity of coke needed in the blast furnaces, the coke ovens will provide an ideal fuel in the form of gas for the steel furnaces, &c., but there will be a surplus of gaseous fuel available in the plant as a whole.

The best economy would seem to be to erect coke ovens at the blast furnaces of sufficient size that the coke oven gas,

together with the blast furnace gas, will provide all the heating requirements of the joint operations. The remaining coke required for the blast furnaces would be purchased from outside.

It can be agreed that for power requirements electricity should be taken from the central distributor wherever feasible, and that, for heating, gas should be used, or a smokeless fuel such as coke (high or low temperature). In the past gas undertakings have not been able to make such special terms with large users as would warrant the use on a large scale of this ideal fuel. Legislation is being introduced that will remedy this; and I would urge that the strongest publicity should be given by gas undertakings as to the possibilities of the extension in the use of gaseous fuel, and further, that all industrial concerns should ask local gas undertakings for technical reports to meet their special requirements.

Discussion.

Dr. C. H. LANDER remarked that in Sir Arthur Duckham's paper there was outlined a policy for dealing with fuel. The paper had been prepared long before the publication of the Report of the National Fuel and Power Committee, but very similar recommendations to those appearing in Sir Arthur Duckham's paper had now been made officially by the Committee. As one responsible to some degree for the research work in fuel undertaken by the British Government, he would like to say a word or two about some of the recommendations in Sir Arthur Duckham's paper. The suggestion that it was necessary that both producers and the consumers of fuel should avail themselves of the specialized knowledge of technically trained men seemed almost a platitude; but unfortunately it was not. There was undoubtedly in this country a great lack of technical co-ordination between the various producers and users of fuel. Here he was referring to something which was mentioned more specifically in the Report of the National Fuel and Power Committee—viz., the Warmestelle in Germany, which was an institution devoted not to research, but to the obtaining and tabulation of data from the various constituent firms, and making this data and experiences available to other members of the organization. That was, of course, extremely important. He sometimes felt that in carrying-out research work they were adding to the indigestibility of the mass of information and data which was before the public, and of which adequate use was not made. There were indications that some such organization might be set up in this country, though perhaps not quite on the same model. In one section of the coal trade a start had even been made, because the Lancashire and Cheshire Coal Research Association had for some time had a small staff whose duty it was to visit the various collieries of the Association, and observe points of interest. The data were then tabulated, and made use of for the benefit of the others.

Another point in Sir Arthur Duckham's paper which should be emphasized was that relating to the economies which resulted from the operation of large-scale units. When they looked at the price, the capital cost, and the output per man per day, it was obvious that the subject so much in the public eye to-day—low-temperature carbonization—had a tremendous long way to go before it could get to the kind of costs that were necessary. It was essential to have costs in connection with low-temperature carbonization very much below what they were before there could be any real hope that it would become a really national asset, as distinct from a localized application in a few particularly favourable areas. With regard to Sir Arthur Duckham's suggestion that greater financial backing should be given to the fuel research organization set-up by the iron and steel industry, it might be interesting to state for the benefit of those who were not so familiar with some of the things in which the Government had an interest, that a Fuel Economy Committee, of which he himself had the honour to be a member, was set-up a few years ago to study the problems of the iron and steel industry. It had been successful; but enlightened people believed that it could do much more work than it did at present if it received greater support. An important point in both papers was the emphasis placed upon development in coke oven design in relation to the economic future of the iron and steel industry. One difficulty which those responsible for coke ovens in this country had to face in the past was that of making up their minds as between the types of oven which had been developed abroad, under the rather difficult financial circumstances in which they in this country found themselves. Some time ago a suggestion was made, which was backed up by the whole of the technical side of the coke oven industry, but which unfortunately did not appeal to the owners, that definite experiments should be made, and a small experimental plant put down by the coke oven industry, in order that first-hand data might be available to the industry as to the behaviour of different types of ovens of different widths in relation to the particular coals in this country. Unfortunately, the suggestion had not been pursued. Though more information was coming in, and the matter was becoming clearer, there was still much to be done in that direction. In all problems affecting the transfer of heat, the engineer, the chemist, and the physicist who had to deal with these problems laboured under a disadvantage, which was not so marked in any other branch of engineering, in that there was no real method of carrying-out experiments by means of models.

STANDARDIZATION OF GAS QUALITY.

Mr. GEORGE HELPS (Nuneaton) remarked that the grouping of gas concerns would mean some standardization of gas quality. There were one or two other factors which concerned this question, and they would be found to be very practical factors. There was a good deal of talk about thermal efficiency; but what did thermal efficiency mean? Most often it meant nothing at all. The gas industry was continually talking of thermal efficiency in regard to the gas producing process, and it was stated to be 80 p.ct. He agreed; but what was the thermal efficiency of electricity generation? It was 17 p.ct.; and he said that without offence to the electrical people. Whereas, however, in the case of gas the result was 80 therms, or 800 H.P., and 10 cwt. of coke, in the case of electricity there was something like 1800 H.P. Could the gas undertakings to-day, with their present processes, go out and displace steam power propositions? No. Could the electricity undertakings? They could, because it was not the thermal efficiency which mattered. He hoped that the time had come when this utter nonsense connected with the gas industry would cease. It was a disgrace for any gas engineer to talk about the thermal efficiency of gas. There was one test that he urged them to apply in connection with this matter of co-ordination of fuel interests. The General Report stated that "the gas industry should pay increased attention to coke sales." The gas industry would be in sorry plight if it had to rely on coke sales for its dividends. The gas industry was formed in Murdoch's time to take the place of candles. To-day there was no industry in the world of more importance than the gas industry, because it could take the place of coal itself.

THERMAL EFFICIENCY.

Dr. E. W. SMITH thought it might be well to point out to the conference that the very fact of the holding of it was indicative that fuel was of pre-eminent importance to all human activities. Therefore, it must be recognized that if the economic position of the various countries of the world was to be improved, the cost of fuel, and the burden of the cost of fuel, in industries must be reduced. The object of this particular meeting was to consider the extent to which co-ordination could assist in this direction. Internationally, co-ordination was important. Nationally, co-ordination as between industries was important; and as one who was engaged solely in the gas industry, he would like to give their Continental friends in particular, and the delegates generally, as well as those who were not closely associated with the gas industry, some idea as to what was being done in the gas industry in order to improve thermal efficiencies and economic efficiencies, and to reduce the cost of their products and improve the over-all efficiency of the processes. Mr. Helps had said that those in the gas industry were constantly preaching the subject of thermal efficiency, that it was a disgrace, and that they ought to be ashamed of themselves—or words to that effect. Personally, however, he wished to state the case from the other point of view. Mr. Helps misunderstood those who talked about thermal efficiency from two perspectives. One was that nationally, whatever the industry might be doing, coal must not be wasted; and even if it cost a little more in any industry, waste must be eliminated and costs reduced in other directions if possible. Consequently it had been found—and it had been demonstrated time after time—that thermal efficiencies could be increased to a point, and that by so doing the cost of the products could be reduced. It was safe to say that, if there had not been the advance of from 60 up to 85 p.ct. in the thermal efficiency of the gas industry during the last forty years, the cost of gas and coke to-day would be considerably greater than it was. That result had not been achieved by any haphazard means. It was fairly safe to say that there was no industry in which the lessons of science and the abilities of technical men were taken greater advantage of than in the gas industry, at any rate so far as some of the undertakings were concerned. The Chairman could tell a very interesting story of the extent to which the Gas Light and Coke Company were employing highly trained technical men and utilizing their knowledge and experience in the development of the various processes in research, in control, and in other directions. The Gas Light and Coke Company, however, were not alone, though they were probably pre-eminent in this direction. A number of other undertakings were working on similar lines; and what appeared to him to be the difficulty in the gas industry—if there was a difficulty, and he believed there was a small one—was that owing to the large number of small undertakings it was not practicable for the smaller ones to utilize to the extent they could the technical abilities and facilities available to all who could afford to use them. It was not practicable in this country to get co-ordinated technical control of undertakings; and consequently, while suggestions had been made as to the establishment of central laboratories—say, in the Lancashire and Yorkshire areas, and in Scotland—this would only, in his opinion, be a palliative and a half-way house to the greater technical control necessary in the gas industry. In spite of this he thought The Institution of Gas Engineers and the other institutions connected with the gas industry could point to their conferences, to their meetings, and in other directions as indicating an extensive co-ordination whereby there was interchange of ideas and information on an extensive scale; and he believed that this form of co-operation had been carried as far as was possible at the moment.

It was not often realized, continued Dr. Smith, how important were fuel economies, and, therefore, thermal efficiencies, as compared with labour. Recently he had seen some figures which indicated that, per therm of gas made, the fuel used in order to make the gas had a financial value equal to something of the order of seven times the value of the labour expended on the coal in the retort house. Even if this were only approximately true, it was obvious that it paid handsomely to increase the thermal efficiency at the ex-

pense of labour. Therefore, when thermal efficiency was stressed in the gas industry, it was stressed almost entirely from the point of view of its effect on the cost of production. Mr. Helps—he only took him as an instance—suggested that, if gas could be made cheaper in any other way at a lower efficiency, then the efficiencies obtainable from dearer methods were of secondary importance, and that they should adopt the less efficient method which was cheaper in the end, than the more efficient process according to Mr. Helps. It would, however, be useful for it to be known that the majority of gas engineers in this country, after great consideration and long experience, were not in agreement with Mr. Helps when he propounded the idea of the advisability of distributing gas of the order of 200 B.Th.U. calorific value. The reasons were, first, that it had never been shown on the scale on which the gas industry worked that it was practicable to produce 200 B.Th.U. gas cheaper, and sell it to the consumer more cheaply, than gas produced by the ordinary present-day methods. If it could be shown that the consumer could get his heat units at the place where he wanted to use them at a much lower cost than was the case to-day, and if it could be proved at the same time—and this was just as important—that the consumer could obtain as high efficiencies in general use (and not by a watched apparatus), there was not the slightest doubt that Mr. Helps would get his ideas adopted in many places. What, however, would be the effect of universally adopting low-grade gas in this country for domestic and industrial purposes, because it was not practicable to consider two types of gas being distributed throughout the towns? There must be one type; and it must be the mean of the requirements of all uses. In the first place, almost all the existing mains were sized for high-grade gas. Low-grade gas required higher pressures and larger mains, and there was likely to be different pressures at different parts of the system unless the mains were big enough, though even then there would be fluctuations. No doubt Mr. Helps would say that these could be got over by individual governors in every household. This had been tried, but it had never met with approval. The consumer would not get any better controlled aeration or a better flame temperature than could be obtained with the gas supplied to-day in the average town with modern equipment.

A very definite advance was taking place in the coke oven industry from a technical point of view. They claimed that 5s. per ton saving with modern ovens was a technical advance, and not an economic advance due to co-ordination. It was a technical advance due to increased thermal efficiencies in the coke ovens, owing to increased outputs, quicker heating, better refractory materials, and a better design of oven—all of which improved the thermal efficiency of the process. At a luncheon a few days previously Sir David Milne-Watson had stated that a large gas undertaking was seriously considering the installation of a 1000 tons per day plant for coke ovens; and if this were done, it would be a very interesting experiment.

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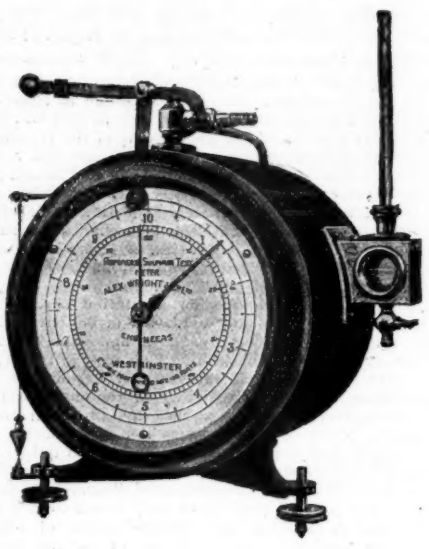

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MISCELLANEOUS NEWS.

SALFORD CORPORATION.

Board of Trade Inquiry.

An inquiry was held at the Board of Trade offices, Westminster, on Wednesday, Oct. 10, by Mr. J. F. Ronca (Director of Gas Administration) into an application by the Salford Corporation for an Order under section 1 of the Gas Regulation Act authorizing them to charge for gas on the therm basis. A number of local authorities whose areas are supplied with gas by the Salford Corporation raised the objection that the maximum price proposed in the Order, of 1s. 3d. per therm, was higher than was justified. One of the local authorities (the Irlam Urban District Council) also objected to a proposal by the Corporation that a clause prescribing a minimum pressure of 2 in. should not apply to the Urban District for the next five years. The Corporation asked for this postponement in order that in the meantime they might carry out the works necessary to enable them to ensure the maintenance of a pressure of 2 in.

The Salford Corporation were represented by Mr. L. C. Evans (Town Clerk), Alderman F. S. Phillips (Chairman of the Gas Committee), and Mr. W. W. Woodward (Gas Engineer and Manager). The objectors were the Eccles Corporation, represented by Mr. A. V. Ridgway (Town Clerk), and Mr. H. W. Angus (Public Lighting Superintendent); the Irlam Urban District Council, represented by Mr. Edwin Jones (Clerk to the Council) and Mr. F. J. Melville (Chairman of the Council); the Prestwich Urban District Council; the Worsley Urban District Council, represented by Mr. H. Lomax (Clerk to the Council) and Councillor G. H. Holt; the Swinton and Pendlebury Urban District Council, represented by Mr. W. T. Postlethwaite; and the Barton-upon-Irwell Rural District Council, represented by Councillor A. H. Manley and Mr. Robert G. Child (Public Lighting Superintendent).

Mr. Evans, addressing Mr. Ronca, dealt with the objections made by the Eccles Corporation in opposition to the Order, which, he said, were representative of those made by the other objectors. The Eccles Corporation had pointed out that by an Order of 1918 the prescribed calorific value of the gas supplied by the Salford Corporation was 500 B.Th.U. per c.ft. In 1862 the maximum price was fixed at 5s. per 1000 c.ft., and the equivalent price per therm would be 1s. The maximum price proposed by the present Order was 1s. 3d. per therm, representing an increase of 25 p.ct., and it was urged that there was no justification for this increase, in view of the fact that the maximum price of 5s. per 1000 c.ft. did not appear to have been exceeded, at any rate in recent years. The present maximum price of 5s., he said, was charged only during the period from Oct. 1, 1921, to June 30, 1922, due to the coal strike; and the present gross charge was 3s. 10d. per 1000 c.ft.

After stating, incidentally, that the Salford Corporation did not want a Therm Order, but that the Act required that it should be made, he pointed out that the Board of Trade were required by the Act to fix a maximum price per therm corresponding as nearly as possible to the existing maximum price per 1000 c.ft., *plus* an amount to cover additional costs incurred in the manufacture and supply of gas since 1914, and due to circumstances beyond the control of, or which could not reasonably have been avoided by, the Corporation. The cost of production in the year ended March 31, 1914, he said, was only 24·2d. per 1000 c.ft., whereas in the year ended March 31, 1928, it had increased to 43·3d. per 1000 c.ft. This was an increase of 19·1d., or 78·92 p.ct.; but the Corporation was asking for an increase of the maximum price by only 25 p.ct. During the coal strike, when prices of coal were high, the undertaking had had to borrow £53,000 odd, which had to be repaid. The amount which could be applied to relief of rates was limited to £10,000 a year, the amount which could be allocated to reserve fund was £7000 per annum (the total reserve fund being limited to £70,000), and there was also an amount of £2089 to be repaid annually to the District Fund for a limited period. Therefore, the figure at which the maximum price was fixed did not matter to the objectors, because after the payments referred to had been made, further profits must be devoted to the reduction of the price of gas. It was obvious that the maximum charge should be such as would allow the Corporation to carry on the undertaking in abnormal times, such as the period of the coal strike, without incurring such debts as had been incurred in the past due to abnormal circumstances.

Mr. Ronca said he was satisfied that he must advise the Board of Trade to authorize the increased maximum price asked for if the Corporation proved that they had incurred extra costs, through circumstances beyond their control, equivalent to that increase.

Mr. Evans, continuing, said that the Eccles Corporation had expressed the hope (in the representations they had made) that the present minimum calorific value of 500 B.Th.U. per c.ft. would be maintained, because a reduction would involve re-adjustment of consumers' burners in order to obtain efficient combustion, and it was probable also that the piping on consumers' premises might not be suitable for passing the greater volume of gas which would be necessary in order to obtain the same heating value as formerly. He pointed out, however, that the Gas Regulation Act required undertakers to give notice of any intended alteration of calorific value, and to pay the costs incurred in the re-adjustment of fittings occasioned thereby. It was the intention of the Salford Corporation, however, to declare a calorific value of 500 B.Th.U. per c.ft.

Another point raised by the objectors was the necessity for frequent testing in order to ensure that the calorific value of the gas was maintained, in view of the fact that the meters registered consumption by volume. In reply to this, he pointed out that the Act made adequate provision for the testing of gas, and that a local authority within the area of supply could appoint a gas examiner, or join with other authorities in doing so. Further, assuming that the calorific value was not maintained, the consumers would suffer equally, whether they were charged per 1000 c.ft. or per therm.

The Pressure Objection.

With regard to pressure, Mr. Evans said that the Order required the Salford Corporation to supply gas at a minimum pressure of 2 in. throughout the area of supply, with the exception of the Irlam Urban District; and it was proposed that in that district the Corporation should not be required to supply at a greater pressure than 1½ in. for a period of five years. Objection was raised to that proposal on the ground that a pressure of 1½ in. was inadequate. He pointed out, however, that Irlam was a considerable distance from the gas-works; the nearest point of the district being more than six miles, and the farthest point more than nine miles, distant. Further, the district of Irlam was 71 ft. below the level of the gas-works, and it had been found very difficult to maintain a pressure of 2 in. during the hours of peak load in winter—*i.e.*, between dusk and about 7 or 8 o'clock. At other times the pressure of 2 in. was maintained. The Corporation had endeavoured to remedy the position, and during the last ten years had spent £13,900 on mains in Irlam. The capital value of the mains in that district, including those laid in an adjoining district for the exclusive use of Irlam, was more than three times as great per c.ft. of gas supplied as the corresponding figure in Salford. The Corporation were not asking for the pressure to be reduced in Irlam, but merely that the obligation to supply at a minimum pressure of 2 in. in that district should not be enforced for five years, so that the Corporation would have time to remedy the defect, and would not be liable to penalties for unavoidable reduction of pressure in the meantime. In this connection he pointed out that the costs incurred in remedying the difficulty would have to be borne by all consumers of the Corporation equally. If the costs were incurred only by the consumers in Irlam, it might not be unreasonable to ask that the time to be allowed should be reduced.

In reply to Mr. Ronca, it was stated that 1d. per 1000 c.ft. on the gas supplied throughout the whole area of supply produced a revenue of £7500.

Reference was made by some of the objectors to provisions which had been inserted for their protection in various enactments of the Salford Corporation, but Mr. Evans pointed out that it was not proposed that any local enactments be repealed, and, indeed, he did not see how the Board of Trade could repeal them. There appeared to be an abundance of caution on the part of the objectors.

Evidence for the Corporation.

Mr. *W. W. Woodward* (Engineer and Manager, Salford Corporation Gas Department) gave evidence, and corroborated Mr. Evans' statement. The proposed increase in maximum price, which he submitted was reasonable, was required only to meet possible emergencies, and at ordinary times it would not make any difference to the actual price of gas if the maximum price were increased to 10s. per 1000 c.ft. It was because of the lower altitude of Irlam in relation to the Salford Gas-Works that there was difficulty in maintaining a pressure of 2 in. there at all times. The present prescribed minimum pressure of 15/20ths was fixed in 1918, so that it was not proposed to make the position in Irlam worse. It was only a matter of time; and Irlam would eventually be supplied at a pressure of 2 in. continuously. It had not yet been decided what method would be adopted in order to enable a 2-in. pressure to be maintained, but in any case the necessary work would cost many thousands of pounds.

Mr. Ridgway, cross-examining, said that in 1918 the calorific value of 500 B.Th.U. was prescribed in substitution for the illuminating value prescribed previously, but it was only since February of this year, when there had been correspondence on the matter, that the standard of 500 B.Th.U. per c.ft. was attained.

Mr. *Woodward* agreed, but said there were very good reasons.

Mr. Ridgway stated that in 1920 the calorific value of the gas supplied was 473 B.Th.U. per c.ft.

Mr. *Woodward* replied that it should have been lower than that in times of emergency, because, under the Gas and Coal (Emergency) Order of 1919, statutory undertakers were not permitted to use in the production of gas a greater amount of coal than would suffice to produce gas of a quality 15 p.ct. lower than that prescribed by any Special Act or Order applying to the undertaking. The quality of gas, therefore, should have been 425 B.Th.U. per c.ft. In any case, if the Salford Corporation had been remiss, the Eccles Corporation had also been remiss, because they had had knowledge of the tests made, and had made no protests.

Mr. Ridgway said that in 1914 the price of gas to small consumers was 2s. 5d. per 1000 c.ft. gross, and 2s. 1d. net; at present the price was 3s. 10d. gross, and 3s. 8d. net. The maximum price of 5s. was fixed in 1862, and he supposed that at that time the actual price would not be very far below the maximum price. In the half-century which had elapsed since then, improved methods had been evolved; and it was reasonable to suppose that there had been a gradual decrease in the costs of producing gas. He suggested, therefore, that a maximum price which was reasonable in 1862 would not necessarily be a reasonable maximum if an undertaking were started *de novo* in 1914.

Mr. Ronca said he did not think he could go into this, and that he was not concerned with the reasonableness or unreasonableness of the present maximum price.

Mr. Ridgway said that if he could establish that the maximum fixed in 1862 was unreasonable in 1914, surely he could urge that it was not necessary to add to that already inflated maximum price a stereotyped percentage to cover the increase in costs of production between 1914 and 1928.

Mr. Ronca did not agree, and said that so long as he was reasonably satisfied that the proposed increase to the maximum price did represent the increased costs incurred due to circumstances beyond the control of the Salford Corporation, he had to add that figure to the pre-war maximum price, however unreasonable that pre-war maximum might be.

Mr. Ridgway asked if he were not entitled to take into consideration actual circumstances.

Mr. Ronca: "Not pre-war circumstances."

Mr. Ridgway pointed out to the witness that the existing maximum price had been adequate for most ordinary circumstances, and he suggested that, but for pressure exerted by the Board of Trade, the Corporation would not have applied for the present Order.

Mr. *Woodward* objected to this suggestion, and denied that it was made even as the result of requests by the Board of Trade. The Board, he said, wished to have all gas undertakings operating under the Gas Regulation Act, and eventually undertakings which did not come in would probably be forced to. The Salford Corporation, however, knowing the wishes of the Board, had done what they had thought to be the right thing. Some time ago they had obtained an Order under section 10 of the Act, and at that time had stated that when they were in a position to reduce the price they would make an application for an Order under section 1. The application was not made earlier because of the difficulties due to the coal strike of 1926.

After some discussion as to the financial history of the undertaking and the interpretation of the Gas Regulation Act, in the course of which Mr. Ridgway said he did not accept Mr. Ronca's interpretation of it with regard to the method of fixing the new maximum price, Mr. Ridgway pointed out that the maximum charge applying to the gas undertakings at Stretford and Manchester was 1s. 1d. per therm, and asked if it were suggested that the Salford undertaking was less competent. He saw no difference between the three undertakings. Mr. Woodward pointed out, however, that the Manchester area of supply was not undermined, whereas parts of the Salford area of supply were undermined. Further, there were large works in Manchester consuming millions of cubic feet of gas per quarter, and the consumption per consumer was much greater than in the Salford area. It was pointed out to him that the Salford undertaking was bigger than that of Stretford, but he replied that he did not know whether the consumption per consumer was greater. The Stretford area included the whole of Trafford Park, one of the largest industrial districts around Manchester. However, he was prepared to leave the matter in the hands of the Board of Trade.

Mr. Edwin Jones (Clerk to the Irlam U.D.C.), cross-examining, said his information was that the level of Irlam was only between 40 and 50 ft., and not 71 ft., below that of the Salford Gas-Works.

Mr. *Woodward* said he had based his statement on the Ordnance Survey levels.

Mr. Jones, referring to the statement that £13,900 had been expended in ten years in order to maintain a reasonable pressure in Irlam, said that in the last ten years the population had grown from 7000 or 8000 to 12,000 or 13,000, and the district had developed out of recognition. Five housing estates had been erected, and the Salford Corporation had taken care to require that gas boilers and cookers were installed; and he suggested that the money had not been expended wholly with a view to maintaining pressure, but to meeting the greater demand for gas.

Mr. *Woodward* replied that this was the same thing, and that the bulk of the money had been spent on trunk mains. The Salford Corporation had no power to require the installation of boilers and cookers.

Mr. Jones said there had been a large number of complaints with regard to the inadequacy of the pressure in the last few years.

Mr. *Woodward* did not agree that there had been a large number.

Mr. Jones said that complaints were received by the Council with regard to pressure, and it was stated that consumers could not use their gas cookers satisfactorily. He had submitted three cases to Mr. Woodward, and it happened that in those three cases the trouble was proved to be due to some fault in the service pipes. Perhaps Mr. Woodward had been lucky in that connection.

Mr. *Woodward* said that complaints were also made about the street lamps in Irlam; and he had pointed out that it was ridiculous to attempt to light part of the main road from Liverpool to Manchester with lamps having single burners, and burning 2½ c.ft. per hour. The lamps in Salford burned 15 c.ft. per hour, and there were two lamps in Salford to one in Irlam. On those representations the Council had decided to increase the public lighting very materially in Irlam, and he had proved that the pressure was ample to fill the mantles and maintain a proper light.

Mr. Jones asked what was the lowest pressure at which gas had been supplied in Irlam.

Mr. *Woodward* replied that he did not think it had ever dropped to less than 15-tenths on any single occasion for five minutes.

Mr. Jones pointed out that the revenue from 1d. per 1000 c.ft. over the whole area of supply amounted to £7500, so that even assuming the cost of the necessary works for increasing the pressure at Irlam were £20,000, and it was met out of revenue, it could be recovered in a little over two years if the price of gas were increased by 1d. per 1000 c.ft. The expenditure would probably not amount to £20,000, however.

Mr. *Woodward* asked if it were to be suggested that everybody in the area should pay 1d. more for their gas in order to enable works to be carried out for the benefit of Irlam sooner than they would be carried out otherwise.

Mr. Jones replied that the cost would not be met out of revenue, so that it would not be necessary to increase the price to that extent.

In reply to further questions, Mr. Woodward said he would undertake to commence the work in April next. He did not know how long it would take, but he had asked that the obligation to supply at a pressure of 2 in. should be postponed for five years.

Mr. Ronca said he had not made up his mind on the matter, but he pointed out that in no previous case in which the parties had failed to agree had the Board allowed five years.

Mr. *Woodward* observed that, if the work were proceeded with through the spring and summer of next year and the following year, it would be nearly completed in the two years; he would undertake to complete it in three years.

Mr. *Melville* (Chairman of the Irlam District Council) said that at present the pressure was insufficient, because the Council were receiving complaints from ratepayers.

Mr. Evans objected to a general statement of this sort unless particulars of the complaints were given, because every complaint investigated so far had turned out to be fallacious.

Mr. Jones, after consulting with Mr. Melville, said that, if the Salford Corporation would agree to complete the work in two years, and the Board of Trade would limit the period to two years, he would not carry the matter further.

Mr. *Woodward* replied that he hoped to complete the work in two years, but could not undertake to do so, because he must have regard to possible abnormal circumstances arising, such as strikes. Further, part of the necessary main would be laid along a main road carrying very heavy traffic, and having concrete and reinforced concrete foundations. Roads were being broken up for the laying of telephone cables and other services, and it would have to be done judiciously.

Mr. Jones asked if it were necessary to lay a main, or whether a booster would be sufficient.

Mr. *Woodward* said he had not made up his mind as to the method to be adopted to ensure the maintenance of pressure; but if boosting were resorted to, it would be necessary to lay a main to Eccles.

Mr. Ronca asked if consideration had been given to the erection of a gasholder which could be filled during slack hours.

Mr. *Woodward* said it was under consideration, but there were difficulties. It would be necessary to notify everyone within 300 yards of the proposed holder, then obtain powers to erect the holder, and then buy the land. When the holder was erected it would have to be filled during the hours of night, and it would be necessary to put on excessive pressure at the works during those hours. As the ground was undermined in this area, he did not want to do this. It would be worse than laying a main. He could not erect the holder in less than two years, and would not undertake to do it in less than three.

After further discussion, in the course of which Mr. Ronca said that, as there was so little difference between the parties, it was a pity to leave the matter to be settled by the Board of Trade,

Mr. Melville said he would accept the offer made by the Salford Corporation that a period of three years be allowed in the Order, with the undertaking that they would endeavour to complete the work in two years.

Alderman *F. S. Phillips* (Chairman of the Salford Gas Committee) undertook that the Corporation would complete the work in two years if possible.

There was further discussion with regard to the interpretation of the Gas Regulation Act in relation to fixing the maximum price. Mr. Ridgway pointed out that the Act gave power to add to the maximum price the amount "reasonably required" to meet increases in costs; and while he did not suggest that the Board of Trade could revise the existing maximum price of 5s. per 1000 c.ft., he held that it was entitled to take into account that the 5s. was more than enough in 1914, and enough to-day in existing circumstances, and that it was not bound to add a stereotyped percentage to it.

Mr. Ronca said that surely in a maximum price one would expect a very wide margin, to meet unforeseen events which practical people knew might happen. He had known cases in which the pre-war maximum prices had not been sufficient to meet the circumstances of the coal strike.

Mr. Ridgway replied that an undertaking could ask the Board of Trade to increase its maximum price if it were found to be inadequate in the future.

Mr. Evans held that it was compulsory to add to the pre-war maximum price an amount reasonably required to cover increases in costs beyond the control of the undertakers, because the Act stated that such an amount "shall" be added. He agreed with Mr. Ronca's interpretation.

The cost sheets relating to the Salford undertaking were submitted; and the inquiry was concluded.

SOUTH AUSTRALIAN GAS COMPANY.

The Annual General Meeting of the shareholders of the South Australian Gas Company was held in Adelaide on Aug. 30—Mr. A. Waterhouse, Chairman of Directors, presiding.

The Chairman, in moving the adoption of the report and balance-sheet, said that the revenue for the year ended June 30 reached the record figure of £761,000; and with regard to the net profit, after the payment of interest on bonds and dividends, £4389 remained to be carried to the credit of the special purposes fund. During the year, 104,718 tons of coal were carbonized and 1526 million c.ft. of gas made. The sum of £73,498 was spent on new mains and services. The new plant at Osborne, capable of making 2 million c.ft. of gas per day, was now completed, together with an 18-in. high-pressure main from thence to the Adelaide Works. A supply was also being extended to Henley and Grange.

Mr. A. Simpson, O.B.E., in seconding the motion, highly commended the methods of salesmanship of the Company, and congratulated the Directors on the good progress made, in spite of the recent industrial depression.

The meeting concluded with a vote of thanks to the Directors and staff, proposed by Mr. H. M. Mudie and supported by Mr. A. A. Bohm.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 15.

There is a fair amount of inquiry for pitch, the present level of prices proving interesting to buyers.

Creosote is rather a quiet market.

Current values are as follows: Pitch, 40s. to 42s. 6d. per ton.

Creosote is about 7d. per gallon.

Pure benzole is about 1s. 8d. per gallon.

Solvent naphtha, 95/160, 1s. 5d. to 1s. 6d. per gallon.

Pure toluole is about 2s. per gallon.

Pyridine is about 5s. per gallon.

Tar Products in the Provinces.

Oct. 15.

The average prices of gas-works products during the week were: Gas-works tar, 31s. 6d. to 36s. 6d. Pitch—East Coast, 42s. 6d. to 45s. f.o.b. West Coast—Manchester, 37s. 6d. to 38s. 6d.; Liverpool, 39s. 6d. to 40s. 6d.; Clyde, 39s. 6d. to 40s. 6d. Toluole, naked, North, 1s. 5d. to 1s. 6d. nominal. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 1½d. to 1s. 2d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid, 5⅞d. to 6d.; salty, 5⅛d. to 5⅜d.; Scotland, 5⅜d. to 5½d. Heavy oils, in bulk, North, 8¼d. to 8½d. Carbolic acid, 60 p.ct., 1s. 11d. to 2s. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole . . .	0 10½	to 0 11	per gallon at works
Motor ,, . . .	1 4½	,, 1 5	,, ,, ,,
90 p.ct. ,, . . .	1 7	,, 1 8	,, ,, ,,
Pure ,, . . .	1 10	,, 1 11	,, ,, ,,

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

Northumberland steams have again been the feature of the market. The improvement of late in their position, after a long period of slump, has been very welcome; and the demand has been such that some of the collieries are even able to indicate rather more than the agreed minimum prices. For Durhams of all kinds there appears to be a slightly better demand. Gas coals are still weak, but, with a better supply of tonnage, bunker qualities are perhaps rather firmer, especially as regards best makes. The general position is, however, still serious, and prices are maintained, at even the present reduced levels, only by considerable restriction of output, which means much idle time.

Wear Special gas makes are quoted at 15s. f.o.b., and best qualities are nominally 14s. 9d. Seconds are 13s. to 13s. 3d., with some brands on offer at 12s. 9d. Coking unscreened is 13s. to 13s. 3d.; but the demand is very quiet, and ordinary qualities are freely offered at 12s. 9d. Best bunkers are 13s. 6d. to 13s. 9d., with ordinaries at 12s. 9d. to 13s. 3d. Best Northumberland screened steams quote up to 13s. 9d., which is an advance of 3d. on the agreed minimum price. Gas coke has been well booked, and prices are firm up to 20s. f.o.b. for shipment.

YORKSHIRE AND LANCASHIRE.

Gas coals in Yorkshire and Lancashire are working easily under contract, and forward figures do not appear to appreciate.

Industrial fuel generally moves slowly under recent advances, with little forward business.

Export coals for prompt shipment are fairly easy, but forward deliveries appreciate.

Domestic coal during the past week has ruled rather on the quiet side, with prices slightly discounted.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports:

South Yorkshire—Hards, Association, export 16s. to 16s. 6d.; screened gas coal, 15s. 6d. to 16s.; washed trebles, 15s. 6d. to 16s.; washed doubles, 14s. 6d. to 15s.; washed singles, 13s. 6d. to 14s. export; washed smalls, bunkers 14s. 3d. to 14s. 6d., export 10s. 6d. to 11s.; smithy peas, export 16s. 6d. to 17s. 6d. per ton.

West Yorkshire—Hartley's (f.o.b. Goole), bunkers 16s. 6d. to 17s. 6d., export 14s. to 15s.; screened gas coal, export 14s. to 15s.; washed trebles, 15s. 3d. to 15s. 9d.; washed doubles, 13s. 6d. to 14s.; washed singles, export 12s. 6d. to 13s.; washed smalls, bunkers 14s. 6d. to 15s.; export 10s. to 10s. 6d.; unwashed trebles, export 14s. 6d.; unwashed doubles, 11s. to 11s. 6d.; rough slack, 8s. 9d. to 9s. 3d.; coking smalls, export 8s. 6d. to 9s. 6d. per ton.

Derbyshire and Nottinghamshire—Top hards, bunkers 19s. 9d. to 20s. 3d., export 15s. to 16s.; cobbles, export 15s. 6d. to 16s. 6d.; washed trebles, 15s. 6d. to 16s.; washed doubles, 13s. to 13s. 6d.; washed singles, 12s. 9d. to 13s. 3d.; washed smalls, bunkers 14s. 3d. to 14s. 6d., export 10s. 6d.; unwashed doubles, export 11s. to 11s. 6d.; rough slack, bunkers 12s. 6d. to 13s., export 8s. 6d. to 9s. per ton.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, bunkers 17s. to 18s., export 13s.; gas coke, export 21s. to 22s. 6d.; furnace coke, 19s. to 19s. 6d.; washed steam, Goole (West Yorks.) bunkers 16s. to 16s. 6d., Hull (West Yorks.) 17s. 9d., Hull (South Yorks.) 17s. 9d. to 18s., export 14s. 6d. to 15s. per ton.

MIDLANDS.

There has been a sharp reaction in the market for household coal. The mild weather of early October was an important element. Consumers in many cases showed themselves resolved not to pay the higher rates demanded till circumstances compelled them to do so. A considerable number of orders placed in September, but which could not be fulfilled owing to the rush for supplies towards the end of the month, have been cancelled. Countermands from the London district represented a big tonnage.

The arrested absorption inevitably had its effect on prices. There was no formal withdrawal or suspension of advances notified by collieries at the beginning of the month. Give and take has been necessary, however, to get over what is regarded as a temporary phase.

Stocks are still comparatively small, and only minor modifications of output have been entailed. Some pits continue to work full time. The average is probably four days a week.

In the market for industrials the sluggish tone persists. This is a weakness which to a great extent neutralizes the seasonal stimulus in the domestic demand. Prices remain easy, and supplies are sufficient. At the quarterly meeting of the Midland iron trade a slight improvement in business created a more hopeful tone. A Derbyshire furnace which has been out of commission for relining is being started again. The market for smelting coke is still weak, however; business being done at about 12s. 6d., ovens.

TRADE NOTES.

Thomas Recording Calorimeter.

The Cambridge Instrument Company, of 45, Grosvenor Place, S.W. 1, have just published a new list, which gives full details of the Thomas recording gas calorimeter. This instrument has recently been approved by the Gas Referees, and is therefore an apparatus in which all gas engineers are taking a keen interest.

"Connersville" Products.

Messrs. W. C. Holmes & Co., Ltd., of Huddersfield, have just published a brochure covering the "Connersville" products which they are offering to the gas and chemical industries. The catalogue includes details and photographs of new high-capacity meters, exhausters, boosters, rotary pumps, air blowers, &c., and should prove of interest to all gas engineers.

New Gasholder for Leigh.

The Leigh Corporation have placed an order with Messrs. Robert Dempster & Sons, Ltd., of Elland, for dismantling an existing single-lift column-guided gasholder, and replacing it by a three-lift spiral-guided holder—the lifts being 94 ft. 3 in., 96 ft. 10½ in., and 99 ft. 6 in. in diameter, each 28 ft. deep—in the existing brick tank. The plans and specification were prepared by the Engineer, Mr. F. Bowen, M.Sc., under whose supervision the work will be carried out.

CONTRACTS OPEN.

Station Meter.

The Gas Committee of the Nelson Corporation invite tenders for the supply of a station meter. [See advert. on p. 216.]

Washer.

The Gas Committee of the Nelson Corporation invite tenders for the supply of a Livesey washer. [See advert. on p. 216.]

Waste-Heat Boiler.

The Gas Committee of the Nelson Corporation invite tenders for a waste-heat boiler. [See advert. on p. 216.]

Mid-Durham Carbonization has been registered as a private company, with a nominal capital of £60,000, in £1 shares, to acquire the business of coke and bye-products manufacturers and merchants recently carried on by the Stella Gill Coke & Bye Products Company.

Increased Sales at Stratford-on-Avon.—At a meeting of the Stratford-on-Avon Town Council last week, Mr. F. Shewring (the Manager of the Gas-Works) presented his seventh annual report. The outstanding feature was the growth in the sales of gas, which have increased by 8,577,000 c.ft., equal to 8 p.ct. The gross profit for the year was stated to be £7182.

Theft of Gas at Emsworth.—A retired naval officer was the defendant in a case heard at the Havant Petty Sessions on Oct. 12, when Engineer Commander Harry Maxwell Attwool, of Emsworth, was summoned by the Portsmouth Gas Company for wilfully preventing a certain gas meter from registering the amount of gas supplied, and also for stealing a quantity of gas, and on two further counts with causing pipes to be laid to communicate with the pipes of the Company. Giving evidence regarding the first two charges, George Edward Fryer, a Superintendent in the employ of the Company, alleged that 280 ft. of illegal piping had been laid in the grounds of defendant's house, and that the pipes had been in the grounds for about three years. On behalf of defendant Mr. E. J. Bechervaise pleaded guilty to the first two charges, and admitted that it was difficult to know how to deal with such a case. The Chairman (Mr. Harvey A. Dixon) said the Bench were agreed that the defendant's action was beyond comprehension. They regarded the offence, however, as a bad one. Defendant would be fined the maximum of £5 on the first charge, and also the maximum of £20 on the second, and would have to pay £2 2s. costs. Mr. Guy Brutton, for the Portsmouth Gas Company, withdrew the other two summonses.

Lower Charges at Driffield.—The Driffield Urban District Council Gas Committee have reduced the price of gas to 3s. 4d. per 1000 c.ft.—a reduction of 5d.

Royal Sanitary Institute.—The Right Hon. Earl Fitzwilliam, K.C.V.O., C.B.E., D.S.O., has consented to act as President of the 40th Congress and Health Exhibition of the Royal Sanitary Institute to be held at Sheffield from July 13 to 20, 1929.

Cheaper Gas at Westward Ho!—As a result of the completion of the extension carried out by the Bideford Gas Company, who have acquired the Westward Ho! Gas Company, the price of gas at the latter place has been reduced from 9s. 6d. to 5s. per 1000 c.ft.

Scottish Coal Products, Ltd., a new public Company with a capital of £500,000, has been registered to enter into an agreement with Technical Oils, Ltd., and others, and to carry on the business of distillers of coal and coal products and manufacturers of bye-products of coal.

Messrs. Main's Laboratory Department.—Messrs. R. & A. Main, Ltd., have started an additional Laboratory Department at their Headquarters at 48, Grosvenor Gardens, S.W. 1; and Mr. Arthur Forshaw, M.Sc., Chief Chemist to the firm, has in consequence moved from Gothic Works, Falkirk, to this address.

Gas in Westminster Housing Schemes.—At the last meeting of the Westminster City Council, Alderman G. Williams-Smith suggested that in the new housing schemes of the Council no coal fires should be provided, and that, if they had central heating, gas fires might be introduced. He understood the principle was being adopted by the London County Council, and thought that every effort should be made to abate the smoke nuisance. Admiral Sir Henry Bruce (Chairman of the Housing Committee) promised to consider the suggestion.

Gas Cooking Demonstrations at Brighton.—On the afternoon of Oct. 9, 150 ladies attended the opening of the autumn session in the Cookery Room, Church Street, Brighton, where the Brighton and Hove General Gas Company have instituted free lectures and demonstration in gas cooking. It is the aim of the demonstrators to be of real practical assistance to every user of the Company's cookers; and during the winter months there will be lectures three times a week—on Tuesdays and Thursdays at 3 p.m., and on Wednesdays at 7 p.m.

Leeds to Consider Joint Gas and Electricity Work.—At Leeds City Council, last week, Alderman D. B. Foster, Chairman of the Electricity Committee, suggested the appointment of a small Committee to inquire into the possibilities of co-ordinating the work of the gas and electricity undertakings, in order to avoid waste in competition between them. He made various claims as to the numbers of people in Leeds who were wanting electricity in place of gas and who, he said, would eventually get it, and suggested that when the new electricity plant was finished the competition between the Departments would be keener, and more wasteful, than ever. Councillor E. J. Clarke, Chairman of the Gas Committee, opposed the suggestion. He regarded it as impracticable, and suggested that, in any case, healthy competition was good for the consumer. The Council, without approving the idea or otherwise, agreed to the appointment of a Sub-Committee to inquire and report.

Embankment Cable Fires.—At the inquiry conducted by Dr. F. J. Waldo last week into the causes of the Victoria Embankment fires which occurred on Sept. 8 and Sept. 30, the jury returned a verdict "That the fire of Sept. 8 was due to an accident." They were of opinion that the fire was caused by a defective London County Council cut-out or switch-box, and were not satisfied with the inspection system of the London County Council. The jury also added the following rider: "We are of the opinion that the London County Council electric lighting system is obsolete and dangerous. It should be replaced by an up-to-date system, thereby eliminating the danger of fire. The London County Council cables should have been overhauled more frequently by an expert after the flooding in January last, as the water affected the cables." With regard to the fire on Sept. 30, the jury found that this was "due to an accident, and was caused by defective insulation of the cable." They were of the opinion that, had not the outbreak been promptly extinguished, the fire would have been far more dangerous.

Progress at Newcastle-under-Lyme.—At the meeting of the Newcastle-under-Lyme Town Council on Wednesday, Oct. 3, a report on the operation of the Gas-Works Management Committee, for the year ended March 31 last, was presented by the Auditor (Mr. J. C. Bladen) and the Gas-Works Manager (Mr. F. L. Wimhurst). The Auditor's financial statement showed a total income of £32,206, while the total expenditure was £24,792, as against £30,864 in the previous year. The gross profit was £7413, compared with £2751. The Manager, in his report, stated that they had spent £11,234 on coal, as against £18,690 in 1926-27, and were making 13,378 c.ft. of gas per ton. The sum of £523 had been spent on main repairs, and 151 meters had been purchased for new consumers. They had produced 3,711,000 c.ft. more gas, and a reduction in price of 2d. per 1000 c.ft. had been effected in the June quarter. After various deductions, there remained a net profit of £1672, which, he suggested, should be spent on heavy but essential repairs to plant, mains, and meters. It was becoming increasingly difficult to make gas at a reasonable and economic figure, owing to the obsolete nature and growing inefficiency of the carbonizing plant, now 34 years old; and he commended to the Committee's serious consideration the thorough overhaul of this portion of the plant at an early date. In moving the adoption of the report, Mr. E. M. Hollins (Chairman of the Committee) said that for many years past insufficient money had been spent on the works; and the question of new retorts was now having earnest consideration, but would have to wait until next year. The Mayor seconded the motion, which was carried.

Loughborough Bank Accident Inquiry.—A verdict of "Accidental death" was returned on Oct. 9, at the inquest on Mr. C. H. Farley, a cashier at the Loughborough Branch of the Midland Bank, who was found fatally gassed on the morning of Monday, Oct. 8, on the Bank premises. He had, apparently, fainted, or been overcome by fumes, when about to light a gas ring on the Saturday afternoon. Dr. W. G. Johnstone observed that the gas ring was in a bad position—on the floor under a sink.

A relative of William Murdoch, the inventor of coal gas lighting, has just died in Glasgow at the age of 105.

During the last ten years the sales of the Leyland Gas Company have advanced from 64,091,300 c.ft. to 102,601,200 c.ft.

At Pontefract gas has been reduced in price, as from Oct. 1, from 1s. 2½d. per therm (5s. 5¼d. per 1000 c.ft.) to 1s. 2d. per therm (5s. 3d. per 1000 c.ft.).

The Birmingham Corporation Gas Committee have decided to display notices at the general and branch office showrooms setting forth the B.Th.U. content of the gas supplied week by week.

The Blackburn Chamber of Trade have organized an industrial exhibition in the Public Hall during October, and the Gas Department have taken a large space for the display of gas appliances.

As a result of demonstrations by the Bradford Corporation Gas Department at a public exhibition during the last fortnight of September, the Department received 122 orders for gas cookers and 42 orders for fires.

The Bradford Corporation Gas Committee have authorized the laying of new mains, estimated to cost £7800, to meet the requirements of newly erected properties, and to effect improved supply in various parts of the district.

The Lostwithiel Gas Light and Coke Company, Ltd., at an extraordinary meeting of the shareholders on Sept. 27, confirmed a resolution previously passed to increase the capital of the Company from £3500 to £4500. Mr. J. H. Jeffery was the Chairman.

As a result of a poll of the parishioners taken at Pinhoe, a village near Exeter, on Monday, Sept. 24, it has been decided that the village shall be lighted by gas lamps during the winter months. Thirty-six lamps are to be provided; and to meet the cost, a rate of twopence in the pound will be necessary.

At a meeting of the Chorley Town Council on Sept. 27, Mr. Myers moved back a resolution that a separate rate be charged to consumers of over 50,000 c.ft. of gas for power. He did not see why industries should be subsidized at the expense of householders. The amendment, however, was defeated.

At a meeting of the Lurgan Town Council the net profit disclosed by the Auditor's report on the gas undertaking for the year ended March 31 was £1054. The Town Clerk, referring to the proposed reduction in the price of gas, stated that Mr. W. Tallentire (the Gas Engineer and Manager) recommended a reduction of 3d. per 1000 c.ft.

The question whether the Stourbridge Public Baths should be lighted by electricity or continue to be illuminated by gas (with the possibility of a high-pressure system) occupied the attention of the Town Council at a recent meeting. The claims of both methods of lighting were discussed, and a decision in favour of the gas was reached by eleven votes to seven.

Reporting to his Committee on the working of the Bradford Gas Department, the City Gas Engineer and General Manager (Mr. E. J. Sutcliffe) stated that proposals towards reducing the price of gas will be submitted at the earliest possible date. Mr. Sutcliffe pointed out that the colliery owners' marketing scheme was tightening the grip on the markets. He thought that next spring it would probably be difficult to overcome the determination of the coal owners to force higher prices from public utility undertakings.

In the Circuit Court, Dublin, on Oct. 9, the Alliance and Dublin Gas Company sued the Minister for Justice for £115 for the destruction of a gas meter in Mountjoy Prison, alleged to have been caused by the negligence of one of the defendant's servants. The evidence was that a warder named Hayes lit a petrol lighter close to where some fitters from the Gas Company were disconnecting a meter, and so caused an explosion, which completely wrecked the meter. The Judge found, however, that the responsibility rested on Hayes alone, and not the Minister; and accordingly the case was dismissed.

Leamington has the advantage of a very efficient mechanical engineering laboratory, where, under the category of Engineering Sciences, Mechanical, Electrical, and Gas Engineering are taught. For their experimental work the students have at their disposal a new 5-H.P. engine which can be run on gas or oil; and by arrangement with the Leamington Priors Gas Company classes are being conducted in gasfitting, &c. It is much to the credit of these classes that no fewer than twelve students have passed the examinations of the City and Guilds of London Institute and of The Institution of Gas Engineers.

The Callington Urban District Council, who have accepted a tender for street lighting for one year from the Callington and District Electric Supply Company, have received an offer from the Company to enter into an agreement to light the town for two additional years. A letter was also received from the Callington Gas Company, stating that they were prepared to enter into a three years' contract for lighting the town. A resolution was passed at a recent meeting that the contract accepted from the Electric Lighting Company be for this year only; Mr. C. S. Skinner contending that, if any extension of contract was contemplated, both Companies should be asked to tender.

STOCK MARKET REPORT.

THERE was no slackening of activity on the Stock Exchange last week. Speculative operations are still in the ascendant; those participating turning from one share to another with the utmost impartiality. The surprise of the week was the sudden American demand, founded on very indefinite rumours, for the principal Tobacco shares, and Bats and Imps both touched record figures. Investment stocks were firm generally, and some headway was made in values. The first home Corporation loan to be floated this autumn is being offered for sale this week. Birmingham offers £5,000,000 4½ p.ct. stock at 97¼, at which figure the flat yield is about 4⅝ p.ct.

In the Gas Market transactions were more numerous than usual. The most noticeable event during the week was the rise of 5 points in the Continental Union ordinary to 35-40. This sudden rise appears to indicate improved prospects. Other than this there was nothing of note to record; but it will be seen that Primitiva ordinary has eased off a further 6d. to 25s.-27s., and that Barnet 7 p.ct. was marked up 2 points to 111-114. Inquiries of the principal London and Provincial Companies show that, in spite of the continued mild weather, there is confidence in the financial results for the current year; the sales of gas in most cases being above those for the previous year.

The following transactions were recorded during the week:

On Monday, Aldershot 75, Alliance and Dublin 4 p.ct. deb. 64¼, Colonial 24s., 8 p.ct. pref. 22s., Commercial 3 p.ct. deb. 60, Continental Union 33, 34, 7 p.ct. pref. 93, European 8 1/16, Gas Light and Coke 19s. 3d., 19s. 4½d., 19s. 5¼d., 19s. 6¾d., 19s. 7¼d., 3½ p.ct. max. 63¾, 4 p.ct. pref. 78, 78¼, 78¾, 3 p.ct. deb. 61½, 5 p.ct. deb. 99½, 101¼, Primitiva 25s. 9d., 26s. 3d., South Metropolitan 107½, 107¾, Tottenham "B" 101. Supplementary prices, Folkestone 80, Gas Light and Coke 5 p.ct. deb. 101¼, 101½, Metropolitan of Melbourne 5½ p.ct. deb. 100¼, Pinner 7 p.ct. "B" 6 1/16, 6⅜, Uxbridge 4 p.ct. deb. 74.

On Tuesday, Alliance and Dublin 96¼, Bournemouth 5 p.ct. 12⅞, 6 p.ct. pref. 11⅛, British 7 p.ct. pref. 116¼, 116½, Commercial 99½, Continental Union 33½, 34, Gas Light and Coke 19s. 4½d., 19s. 7½d., 4 p.ct. pref. 78, 78½, 3 p.ct. deb. 62, 5 p.ct. deb. 101½, Imperial Continental 173, 174½, 3½ p.ct. deb. 68, Primitiva 25s. 7½d., 25s. 9d., 26s., South Metropolitan 107½, 107⅞, 107⅝, 108¼, Swansea 7 p.ct. pref. 100½, Uxbridge 5 p.ct. 93½, 94½. Supplementary prices, Gas Light and Coke 5 p.ct. deb. 1952-57, 101¼, 101½, Northampton 81½, 82, Tunbridge Wells "C" 149.

On Wednesday, Barnet 7 p.ct. max. 112½, 113, Commercial 99, 99½, 100, Continental Union 33, 33½, 35, 7 p.ct. pref. 93, Gas Light and Coke 19s. 4¼d., 19s. 6d., 19s. 7½d., 3½ p.ct. max. 63¼, 4 p.ct. pref. 78, 78¾, Imperial Continental 173¾, 3½ p.ct. deb. 69, Primitiva 25s. 3d., 25s. 4½d., South Metropolitan 107½, 108¾, 3 p.ct. deb. 59½, Swansea 7 p.ct. pref. 101¼. Supplementary prices, Barnet District 4 p.ct. deb. 78, Gas Light and Coke 5 p.ct. deb. 1952-57, 101¼, 101½, Liverpool 5 p.ct. 90½, Metropolitan (of Melbourne) 5½ p.ct. deb. 100¼.

On Thursday, Alliance and Dublin 97½, British 115½, Commercial 99½, Croydon max. div. 85, European 8⅝, Gas Light and Coke 19s. 4½d., 19s. 7½d., 3½ p.ct. max. 63¾, 4 p.ct. pref. 78½, 3 p.ct. deb. 60, Montevideo 96½, Primitiva 25s., 25s. 7½d., 25s. 9d., South Metropolitan 107½, 3 p.ct. deb. 59½, 6½ p.ct. deb. 100½. Supplementary prices, Gas Light and Coke 5 p.ct. deb. 1952-57, 101½, Liverpool 5 p.ct. 90½, 91, Rochester, Chatham and Gillingham 8 p.ct. deb. 101.

On Friday, Aldershot 77, Alliance and Dublin 96½, 96¾, British 117, Cardiff 97, Commercial 3 p.ct. deb. 59, 60, Continental Union 36½, 7 p.ct. pref. 93, European 8¾, Gas Light and Coke 19s. 4½d., 19s. 6d., 19s. 6¾d., 19s. 7d., 19s. 7½d., 3½ p.ct. max. 63¾, 5 p.ct. deb. 99¾, Imperial Continental 3½ p.ct. deb. 68½, 69, Primitiva 25s. 3d., 25s. 4½d., 25s. 6d., 25s. 7½d., South Metropolitan 108¼, South Suburban 108, Swansea 7 p.ct. pref. 101. Supplementary prices, Barnet District 4 p.ct. cons. deb. 78½, Gas Light and Coke 5 p.ct. deb. 1952-57, 101¼, 101½, Grays and Tilbury "B" 10, 10½, Metropolitan (of Melbourne) 5½ p.ct. deb. 100¼.

There was a good demand for new loans at the end of the week. After opening at 4 p.ct., however, the situation became easier, and the rate gradually fell to 3½ p.ct. For old day-to-day loans 3¾ p.ct. was charged. Treasury Bills were allotted at 1s. 8d. p.ct. above the previous week's rate at £4 7s. 7·53d. p.ct., and discount rates hardened in consequence.

Business in the Foreign Exchange Market was quiet. Gold exchanges were inclined to move against sterling, and the closing rates were: Dollars 4.85 5/32, and Marks 20.38. French, Dutch, and Italian currencies were steady at 124.22, 12.10½, and 92.63 respectively. Spanish pesetas were higher at 29.98; and Belgas unchanged at 34.90.

Silver was again lower in price, the cash quotation declining to 26½d. per oz. Gold remained at 84s. 11½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21, 1927. The Banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

Issue.	Share.	When ex-Dividend	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Oct. 19.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Aug 30	5	5	Aldershot 5 p.c. max. C. .	72—77	..	75—77
412,992	,,	,,	4	4	Do. 4 p.c. Pref. . .	68—71	..	..
1,581,868	,,	Sept. 27	7	7⅛	Alliance & Dublin Ord. .	95—98	..	96½—97¼
874,000	,,	July 12	4	4	Do. 4 p.c. Deb. . .	63—66	..	64¼
522,654	,,	Aug. 30	7	7	Barnet Ord. 7 p.c. . .	111—114	+2	112½—113
800,000	1	Oct 11	1/7½	1/4½	Bombay, Ltd.	20/—22/-*	—1/-	..
170,000	10	Aug 30	8½	8½	Bournemouth 5 p.c. . .	12½—13½	..	12⅝
600,050	10	,,	7	7	Do. B 7 p.c. . .	12½—13½	..	..
375,000	10	,,	6	6	Do. Pref. 6 p.c. .	10¼—11⅛	..	11⅛
50,000	Stk.	July 12	3	3	Do. 3 p.c. Deb. .	66—69	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb. .	75—78	..	..
357,900	,,	Aug. 30	7½	7½	Brighton & Hove 6 p.c. Con.	114—117	..	..
341,880	,,	,,	6⅝	6⅝	Do. 5 p.c. Con.	101—104	..	..
1,287,500	,,	July 26	5	5	Bristol 5 p.c. max. . . .	90½—91¼a	..	..
885,000	,,	Sept. 27	7	8	British Ord.	114—117	..	115½—117
100,000	,,	June 28	7	7	Do. 7 p.c. Pref. . . .	114—117	..	116¼—116½
130,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. .	74—77	..	..
300,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. .	95—98	..	..
100,000	10	May 24	6	8	Cape Town, Ltd. . . .	8—9	..	..
100,000	10	Apl. 26	4½	4½	Do. 4½ p.c. Pref. . .	6¼—7¼	..	..
150,000	Stk.	June 28	4½	4½	Do. 4½ p.c. Deb. . .	73—78	..	..
696,860	,,	July 26	6	6	Cardiff Con. Ord. . . .	96—99	..	97
287,860	,,	June 28	7½	7½	Do. 7½ p.c. Red. Deb. .	100—103	..	..
187,150	,,	Aug. 16	6½	5	Chester 5 p.c. Ord. . . .	88—93b	..	..
79,185	1	Oct. 11	1/-	1/-	Colombo Ltd. Ord. . . .	35/—37/-*	—1/-	..
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. .	20/6—22/6*	—/6	..
375,402	1	Oct. 11	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	23/—25/-*	..	24/-
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	21/—23/-*	..	22/-
2,078,280	Stk.	July 26	7	5	Commercial Ord. . . .	98—101	..	99½—100
475,000	,,	June 14	8	8	Do 8 p.c. Deb. .	57—60	..	59—60
800,000	,,	Sept. 27	11	11	Continental Union, Ltd. .	35—40	+5	35—36½
200,000	,,	,,	7	7	Do. 7 p.c. Pref. .	90—95	..	93
787,560	,,	Aug. 16	7	7	Croydon sliding scale . .	109—112	..	..
403,100	,,	,,	5	5	Do. max. div. . . .	84—87	..	85
492,370	,,	Aug. 16	10	7	Derby Con.	115—120c	..	..
55,000	,,	June 28	4	4	Do. Deb.	71—73c	..	..
909,000	,,	Aug. 30	5	5	East Hull Ord. 5 p.c. . .	75—78	..	..
50,000	,,	June 28	5	5	Eastbourne 5 p.c. Deb. .	94—97	..	..
1,002,180	10	Sept. 13	16	14	European, Ltd.	8—9	..	8⅜—8 7/16
18,708,480	Stk.	July 26	5/1¼	5½	Gas Light & Coke 4 p.c. Ord.	19/3—19/9f	—/1½	19/3—19/7½
2,600,000	,,	,,	8½	8½	Do. 8½ p.c. max. . . .	62—64	..	63¼—63⅝
4,157,030	,,	,,	4	4	Do. 4 p.c. Con. Pref. .	77—80	..	78—78½
5,603,620	,,	June 14	8	8	Do. 8 p.c. Con. Deb. .	61—63	..	60—62
181,315	,,	,,	6	6	Do. 6 p.c. Br'tf'd Rd. Db.	103—106	..	..
1,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. .	99—101	..	99½—101½
42,008	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb. .	..	..	..
82,500	,,	Aug. 30	6⅔	7	Hastings & St L. 5 p.c. Conv	95—100	..	..
258,740	,,	,,	5⅓	5⅓	Do. 8½ p.c. Conv.	75—80	..	..
70,000	10	Oct. 11	†10	†10	Hongkong & China, Ltd. .	13—14*	—½	..
173,300	Stk.	Aug. 30	5	5½	Hornsey Con. 8½ p.c. .	85—87	..	..
1,976,000	,,	May 24	10	10	Imperial Continental Cap.	171—176	..	173—174½
223,130	,,	Aug. 16	8½	8½	Do. 8½ p.c. Red. Deb.	67—69	..	68—69
285,342	,,	Aug. 16	7	7½	Lea Bridge 5 p.c. Ord. . .	98—101	..	..
2,145,907	,,	Aug. 16	5½	5½	Liverpool 5 p.c. Ord. . .	90—91b	..	..
600,000	,,	Sept 27	7	7	Do. 7 p.c. Red. Pref.	102½—103½b	..	..
165,736	,,	Aug. 14	8	9	Maidstone 5 p.c. Cap. . .	112—117	..	..
63,480	,,	June 14	3	3	Do. 3 p.c. Deb. . .	55—58	..	..
75,000	5	June 14	18	18	Malta & Mediterranean .	5½—6	..	..
641,920	Stk.	May 24	16	17	Montevideo, Ltd. . . .	96—98	..	96½
2,061,315	,,	Aug. 16	5	5	Newcastle & Gateshead Con.	16/3—16/9df	..	..
860,929	,,	,,	4	4	Do. 4 p.c. Pref. .	71½—72½d	..	..
491,705	,,	June 28	3½	3½	Do. 3½ p.c. Deb. .	69½—70½	..	..
131,780	,,	Aug. 30	6/18/0	7/1/0	North Middlesex 6 p.c. Con.	96—99	..	..
900,000	,,	Apl. 26	9	7	Oriental, Ltd.	115—118	..	..
188,120	,,	June 28	7½	7½	Plym'th & Ston'house 5 p.c.	107—112	..	..
414,500	,,	Aug. 30	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	101—104	..	..
286,732	,,	,,	5	5	Do. 5 p.c. max.	79—82	..	..
2,334,464	1	—	—	—	Primitiva Ord.	25/—27/-	—/6	25/—26/3
244,500	100	June 1	4	4	Do. 4 p.c. Red. Deb. . .	91—94	..	..
695,000	Stk.	July 26	4	4	Do. 4 p.c. Red. Deb. 1911	78—80	..	..
416,345	,,	June 28	4	4	Do. 4 p.c. Cons. Deb. . .	78—80	..	..
150,000	10	Sept. 27	6	6	San Paulo 6 p.c. Pref. . .	81—82*	..	..
270,000	Stk.	Aug. 30	6	6½	Sheffield A	103½—104½e	..	..
419,368	,,	,,	6	6½	Do. B	103½—104½e	..	..
1,047,000	,,	,,	6	6½	Do. C	103½—104½e	..	..
90,000	10	June 14	‡3	‡4	South African	4—6	..	..
6,609,895	Stk.	July 26	7½	5	South Met. Ord.	107—109	..	107½—108½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	110—113	..	..
1,895,445	,,	July 12	8	8	Do. 8 p.c. Deb. . .	59—61	..	59½
784,000	,,	Sept 13	6½	6½	Do. 6½ p.c. Red. Db.	100—102	..	100⅝
91,500	,,	Aug. 16	8½	8½	South Shields Con. . . .	108—110d	..	..
1,243,795	,,	July 26	6½	6½	South Suburban Ord. 6 p.c.	106—109	..	108
868,827	,,	June 28	5	5	Do. 5 p.c. Deb.	97—100	..	..
647,740	,,	Aug. 30	5	5	South'mpton Ord. 5 p.c. max.	77—79	..	..
121,275	,,	June 28	4	4	Do. 4 p.c. Deb.	72—75	..	..
250,000	,,	Aug 30	7	7	Swansea 7 p.c. Red. Pref. .	101—103	+1	100½—101½
200,000	,,	June 28	6½	6½	Do. 6½ p.c. Red. Deb.	101—103	+1	..
120,000	,,	July 26	7⅛	8	Tottenham District A 5 p.c.	117—122	..	..
882,275	,,	,,	6½	6½	Do. B 8½ p.c.	99—102	..	101
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	96—99	..	..
191,255	,,	June 14	4	4	Do. 4 p.c. Deb.	76—79	..	..
289,034	,,	Aug. 30	6 5/8	6⅞	Uxbridge, Maidenhead, & Wycombe 5 p.c. . . .	90—95	..	93½—94½
98,200	,,	,,	5	5	Do. 5 p.c. pref. .	87—92	..	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	,,	July 12	8¼	8¼	Wandsworth A 5 p.c. .	126—129	..	..
255,636	,,	,,	7	7½	Do. B 3½ p.c. .	108—118	..	..
432,595	,,	,,	5/19/0	6¼	Do. C and New	96—101	..	..
352,000	,,	,,	6¼	6¼	Do. Wimbledon 5 p.c. .	104—109	..	..
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c. . .	110—115	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref . . .	88—91	..	..
88,425	,,	June 28	8	8	Do. 8 p.c. Deb. . . .	56—59	..	..
284,745	,,	,,	4	4	Do. 4 p.c. Deb. . . .	75—78	..	..
207,500	,,	,,		5	Do. 5 p.c. Deb. . . .	98—100	..	..

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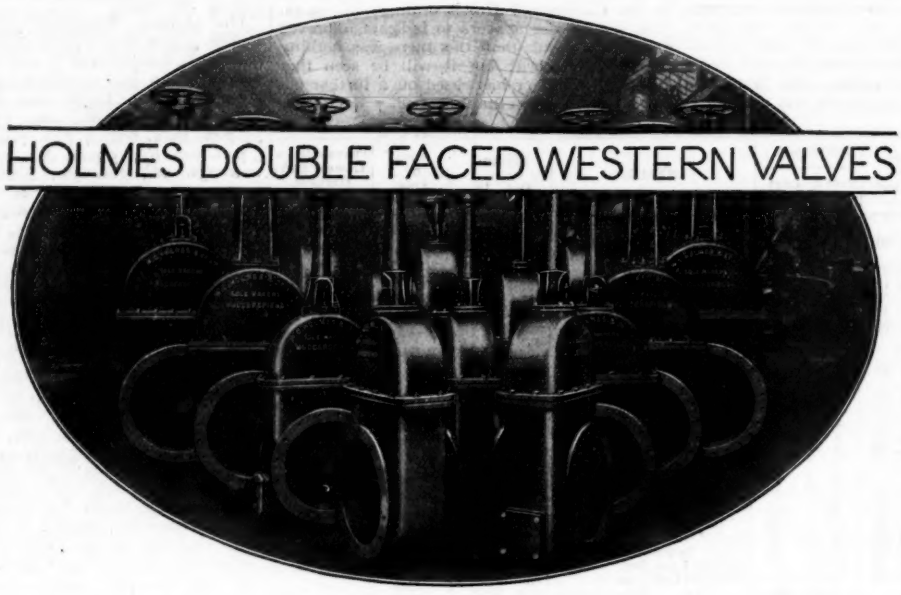

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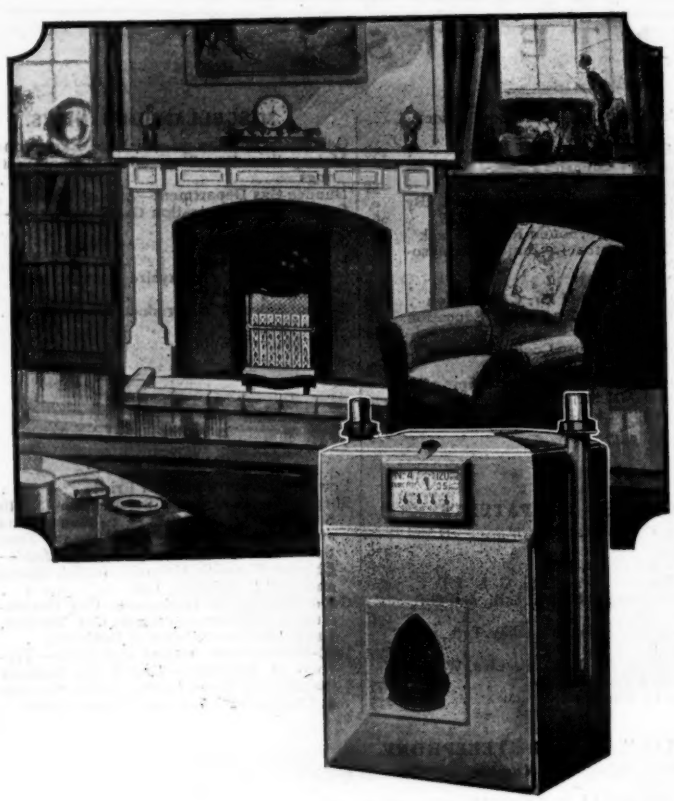

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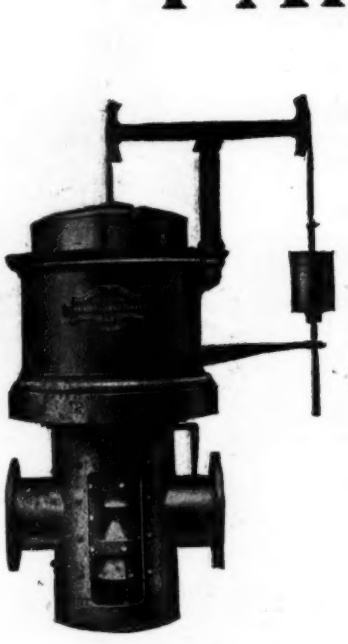

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